

ISSN 1911-2017 (Print)  
ISSN 1911-2025 (Online)

# ASIAN SOCIAL SCIENCE

Vol. 13, No. 12 December 2017



CANADIAN CENTER OF SCIENCE AND EDUCATION

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# Latin American Immigrants' Adaptation Experiences in Korea: Cases of Migrant Workers with Professions in Culture and Entertainment Sectors

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Received: September 26, 2017      Accepted: October 1, 2017      Online Published: November 28, 2017  
doi:10.5539/ass.v13n12p1      URL: <https://doi.org/10.5539/ass.v13n12p1>

## Abstract

This paper explores the cultural adjustment experiences of Latin American migrating professionals in Korea. Two areas of studies on immigration are adopted to conceptualize the experiences of Latin American migrating professionals in Korea: transnationalism and racial reconstruction. I used qualitative interviews to examine Latin American migrating professionals' adjustment experiences in Korea. Latin American migrating professionals' experiences involving immigration to Korea are characterized by relatively short-term sojourns, isolation, and racial visibility in Korea. The result suggests that they use adaptation strategies to overcome isolation and to achieve the reformation of racial identity. This study will contribute to (1) theorizing transnationalism and the racial reconstruction of Latin American migrant workers, and (2) our understanding of Korean society's readiness to receive immigrants, through examining Latin American migrating professionals' experiences with Korean society and culture.

**Keywords:** immigration, Latin America, migrating professionals, Korea, racial identity, adjustment strategies

## 1. Introduction

### 1.1 Immigrants in Korea

Recent trends in studying immigration as a transnational phenomenon have emphasized exchanges and networks between immigrant groups and their home countries, focusing on the flow of capital, culture, and information that transcends national borders (Basch, Schiller, & Blanc, 2005; Schiller & Faist, 2010; Schiller, Basch & Blanc, 1995; Kivisto, 2001). Korean society is not an exception when it comes to the formation of transnational societies around the world. The increased number of immigrants in Korea has resulted in a rapid increase in the number of studies on immigrants by Korean researchers over the past 10 years. South Korea (henceforth Korea) has imported a significant number of migrant workers since the early 1990s. As a result, the number of foreigners living in Korea, as of the end of 2016, totaled more than 1.8 million. This total represents about 3.6 percent of the total population of 49 million (Korean Immigration Service 2016). The number of foreigners in Korea has more than tripled since 1997, when the total was 386,972.

Korean immigration researchers (Kim, 2008; Kim, 2009) have paid attention to conflicts and the adaptation process that immigrants experience while staying and settling in Korean society. In a study that compared Latin American immigrants in Korea with those in Japan (Joo 2012), the researcher focused on socio-cultural adaptation. As Joo (2012) pointed out, the number of Latin American immigrants is small compared with other immigrants in Korea. However, compared with other countries with immigrants, such as Europe, East Asian countries, including Korea and Japan, are known to be "countries of migrant worker sojourn and not true immigration" (Seol & Skrentny, 2009, p. 579). Most scholars of immigration have focused on the integration of migrants, with many studies of immigration addressing the economy, the labor market, and policy (Joo, 2012). However, research is lacking on the factors that lead migrants to stay, according to Seol and Skrentny (2009).

In addition, researchers have looked at what Koreans think about foreign workers and what workers, in turn, think about Korea (Han, 2003; Lee, 2001; Choi, 2009). The "socio-cultural adaptation" examined in these studies refers to adaptation to a unified Korean culture. Such an approach is based on the premise that immigrants must adapt to Korean society and culture, probably because these studies have been carried out mainly on unskilled workers, and it has been thought that adaptation is a "must, not a choice" as long as these workers are living in Korea (Kim, 2008, p.163). In other words, it is understood that the degree of adaptation of the foreign workers who constitute a part of the domestic labor market is important for Korean society and immigration policies.

As such, the studies on professional immigrants who work in Korea have paid attention to regional differences in foreigners' ways of living and adaptation, pointing out that the concept of "adaptation to Korean society" has been too broad. In studies on professional foreigners in Korea, Choi (2009) found that professionals and students asked for help from others when they experienced difficulties, whereas married immigrants and immigrant workers attempted to

solve their difficulties by themselves. Thus, methods of adaptation are closely related to professional foreigners' social relationships.

Although studies on transnationalism and migrant workers used to focus on unskilled laborers, recently, numerous scholars came forward to examine professional workers' migration. The parties among expatriates, professional laborers, have broadened our understanding of migration and transnationalism in the era of a global network (Colic-Peisker, 2010; Croucher, 2012; Cranston, 2016 just to name a few). For example, Colic-Peisker (2010) investigated migrating career professionals who had spent extended periods of time in at least three countries. She contrasted with the transnationalism studies because these migrating professionals develop a form of transnationalism that transcends national and territorial affiliations. Croucher (2012) argued that culture is an area that needs to be better understood, as primarily studies focusing on the economics of migration or social networks exist, but relatively little exists about culture. She made clear that the status of the "migrant of privilege" exists not only due to the individual's own social and/or economic status but also due to the relationship between the home country and the host country. For example, many times the relation of colonialism is involved. In most cases of "transnationalism" documented in studies, the migration usually occurs from the Global South (colonized) to the Global North (colonizer's country). Cranston (2016) challenged the binaries of "global" and "local" to examine how corporations that employ foreign professionals are redefining the perception and representation of "global work," changing it from a "hardship" to an "opportunity."

I argue that exploring professional migrants' adjustment experiences in Korea is important because their experiences reflect Koreans' perceptions of the world and of themselves in the process of globalization. Although many studies of "sociocultural adaptation" generally dealt with an individual's adaptation to the host country's culture and institutional norms, their limitation was that they examined the adjustment of individual students. The challenge is seeing how migrating professionals as a *group* negotiate the terms of their relationship to Korea and to the workplace. When the professions are extremely diverse among Latin American professional migrants in Korea (e.g., soccer coach, soccer player, chef, Spanish teacher, musician), how do we look beyond the individuals' differences to reveal commonalities in how Latin Americans as a group tend to negotiate their presence in Korea?

To understand the negotiation of their presence in Korea, we need to look at how Latin Americans see themselves in a country where no racial classification exists to conceptualize the diverse ethnic and racial groups in Latin America. In a country such as the United States (US), where diverse immigrants reside, a new ethnic-racial mapping has occurred (Urciuoli, 1996; Tatar, 2008). Mexicans are not distinguished as a particular "race" in their home country; rather, they are assigned to racial categorization in the US, being called a "Hispanic" or "Latino" (Urciuoli, 1996). Meanwhile, Latin Americans are given the new racial position of "Latinos" in the US. Hence, Latinos have also come to perceive their own identity as a race in the US. For example, De Genova and Ramos-Zaya (2003) demonstrated that Latinos from various countries attempted hierarchical reassignment in a factory in Chicago in consideration of their U.S. racial classifications according to the meaning of U. S. citizenship. Leinonen (2012) demonstrated that White Americans are located in various domains of immigrant visibility in Finland. Likewise, when several ethnic and racial groups of Latin Americans come to Korea, they might locate themselves differently, according to how Korea sees them.

This study on migrating professionals will contribute to understanding the current transnational landscape in Korea and other countries and to understanding transnationalism and racial reconstruction. In the following, I describe the general characteristics of Latin American expatriates in Korea and the research subjects who participated in the interview I conducted.

### *1.2 General Characteristics of Latin American Professional Migrants in Korea*

Even though migrating professionals may be defined according to their education and skill levels, the most complex issue is how to define and classify the various levels of skills that professional workers have. This difficulty exists because the criteria and basis for skills differ by country and industry. For example, because each field—information communication, finance, law, culture and art—has its own concept of skills, and because the degree of skill required is different in each country, comparing foreign professionals to Korean professionals is difficult. In addition, the system of higher education in each country may differ; thus, skill levels may vary depending on professionals' experience after their education, even though the classification of skill is usually made by education level. If the definition of professionals is narrowed simply to education and skill levels, because the number of Latin American professionals is low as a percentage of total foreign professionals, the number of Latin American professionals will rapidly drop. Furthermore, portraying the distinct characteristics of each country is practically difficult. Therefore, for this paper, we use the definitions in a study by Im and Song (2010), classifying types of professionals by their residence statuses according to the Korean immigration control regulations, for convenience sake. According to the Immigration Control Act of Korea, foreign technical professionals are classified in the E-1 to E-7 categories depending on their visa types. In addition, the employees of investment companies (D-8-1) and religions (D-6) should be included depending on the type of visa.

According to recent statistics, the number of Latin American professionals compared to the total number of foreign professionals. Professionals from Latin America who live in Korea account for only about 1% out of all migrant workers. The total number of documented foreign immigrants is 932,983, and among them, expatriates make up about

5%, whereas Latin American expatriates make up 1% (Korean immigration service 2016). Most professional immigrants in Korea are from the US and Canada, with the majority of them being education-related workers. About 20.8% of men and about 4.9% of women from Latin America in Korea are professionals, with the average being 14% of total Latin Americans in Korea. The distribution of professionals is concentrated mainly in the capital and metropolitan areas. Foreign professionals in southern areas are concentrated in Geoje, where heavy industries have developed because Latin American workers are residing there, especially Brazilian workers who have been sent out to shipbuilding-related companies. Even though technical guidance (E-4) is also an important part of the professions, it was excluded from the status survey, as not many workers enter Korea with this type of visa. Under these restrictions, then, the number of Latin American professionals living in Korea is not large, and a significant difference also exists in the population proportion depending on the country and occupation.

**2. Methods of the Study**

*2.1 Research Site and Methods*

This research was conducted with the purpose of obtaining general information about Latin American immigrants in Korea. Data collection was carried out through in-depth interviews with informants from July to October 2011. The subjects of the study included 23 Latin Americans who came to Korea through individual agencies or personal networks. The interview data of professionals sent to Korean companies on a large scale for short-term contracts, such as the Brazilian professionals concentrated mainly in Geoje, are excluded in this paper because these professionals are different from others in the sense that Brazilian companies hire them, whereas Korean companies hire others. In-depth interviews were carried out in Spanish or English, in the case of Brazilians, with 12 Latin American expatriates among them, and with the following procedures: expatriates in various fields were selected as a sample for one-on-one interviews. Interviews were carried out with Latin American professionals in and around the Gyeongsangnam-do area, including Busan, and especially in the Ulsan area, where mainly researchers live. However, interviews were also carried out with the professionals in the Seoul area because limiting the area would have made it difficult to collect enough varied cases. I found my interviewees through internet sites but also by using the snowball sampling method: through the networks of friends or those who had already participated in an interview.

The interviews were conducted with the goal of obtaining information about participants’ experiences in Korea, and this goal was pursued specifically through combining structured and unstructured interviews. The structured interview questions were divided into five broad areas: (1) basic information, such as the age, residence status, and area of residence; (2) everyday life in Korea; (3) the networks in Korea; (4) the relationships among Korea, their home countries, and their positions; and (5) others. Their adaptation strategies were investigated by focusing on their experiences in everyday life in Korea and on their Korean relationships. Interviews were carried out in English with Brazilian professionals and in Spanish with other Latin American professionals. The duration of the interviews varied from one hour to two hours. I interviewed them at a coffee shop or at the lounges of their companies.

*2.2 Research subjects*

The subjects of this study were Latin Americans engaged in culture and art fields, such as sports and music, and in education, in such positions as professors and lecturers. They can move freely between Korea and their home countries, and they reflect the cultural and economic globalization of Korea. The Latin American professionals whom we interviewed, who were cooks, musicians, and football players—that is, who came to Korea with the residence statuses of those in the arts and entertainment—had obtained their current jobs mainly through the advertising of companies and agencies. Of the remainder of those interviewed, the majority had entered Korea through private networks. Among all of the professionals interviewed, college lecturers and cooks particularly reported that they came to Korea after seeing advertisements from private companies.

Even though women are often said to seek marriage or settlement as immigrants in a society, the Latin American women were not the only ones who indicated such a trend (Kim 2009); some of the male professionals had also gotten married or settled in Korea. If they already had relationships with or wished to marry Koreans, a strong possibility existed that the migrant professionals would live in Korea. However, in most cases, except for the case of getting married to a Korean, they immigrated to Korea with the expectation of staying for only two or three years. However, they sometimes extended the period of stay for two to three years if they were satisfied with their workplaces, and in other cases, the informants occasionally decided to stay longer depending on whether they found various social services appropriate for living in Korea with their families.

Table 1. Overview of Interviewees

	Gender	Nationality	Age	Occupation	Area of Residence	Duration of Stay	Others
1	F	Mexico	42	Spanish Instructor (college)	Ulsan	10 years	
2	F	Peru	26	Part-time Spanish Instructor	Busan	1.5 years	Married to a Korean
3	F	Chile	51	Pastor	Busan	25 years	Married to a Korean
4	M	Peru	31	Cook	Seoul	1.4 years	

5	M	Mexico	41	Doctoral-level researcher	Seoul	6 months	Married to a Korean
5	M	Brazil	23	Football player	Ulsan	1.6 years	
6	M	Brazil	31	Physical trainer	Ulsan	2 years	
7	M	Mexico	46	Consultant in the Spanish-speaking company	Daegu	20 years	Married to a Korean
8	M	Ecuador	35	Musician	Jinju	5 years	8 and 9 are brothers
9	M	Ecuador	30	Musician	Jinju	5 years	
10	M	Peru	32	Musician	Seoul	4 years	10 and 11 are cousins
11	M	Peru	31	Musician	Seoul	4 years	
12	M	Peru	29	Musician	Seoul	4 years	Friend with 10,11

The only immigrants who communicated partially in Korean among the interviewees were the pastor from Chile, who has been living in Korea for 25 years, and the Spanish instructor from Peru. Both of them married Koreans and settled in Korea or at least have no plans to return to their home countries. However, other interviewees who had married Koreans were not necessarily able to speak Korean. They could speak English as well as Spanish, their mother tongues. Therefore, they do not learn Korean because they can communicate in English, but in many cases, they do not try to learn Korean because they are not planning to live in Korea permanently.

In this paper, I argue that immigration from Latin America should be viewed in a different way from that demonstrated in previous studies confined to immigration from Asia. Furthermore, as the immigration of unskilled workers has mainly been studied, studies on professional workers are relatively scarce. In its focus on the professionals among Latin American immigrants in Korean society, the aim of this paper is to investigate the relationship between Korea and Latin America by particularly looking at the professional immigrants' ways of experiencing Korean society.

### 3. Result

#### 3.1 "A Place just to stop by": The Migration Path to the Global Korean Labor Market

Korea (or Japan) has been known to "import foreign workers while avoiding a multiethnic society" (Seol and Skrentny, 2009, p. 588). However, empirical research revealed that, in fact, the majority of the informants for the survey agreed to allow migrant workers' settlement, although negative results were found regarding "whether Korea should become multiethnic society or not." However, as Seol and Skrentny (2009) further demonstrated, among 46 countries, Korea was the only country that expressed opposition to more restrictive immigration policies. Thus, public opinion does not reveal a hostile attitude toward immigrants, and this is not the main reason that foreigners do not stay in Korea.

A Peruvian working as a cook in a Peruvian restaurant in Seoul said that he was motivated to come to Korea because ever since his childhood, he had wanted to visit the continent of Asia someday to learn about it firsthand. At first, he did not think that going to Korea would be the start of a visit to Asia, but he obtained his current job in the restaurant and came to Korea after seeing a recruitment ad from a help-wanted column on a Korean website related to Latin America, which was called "Viva Latin." He came to Korea two years ago on a four-year contract, and he might stay in Korea a little longer if given the chance to do so; if not, he will go back to Peru.

Ricardo,<sup>1</sup> a 31-year-old Brazilian physical coach, was recruited two years ago through the Ulsan Hyundai Tiger Football Club, a professional football team in Ulsan. Sport personnel, such as players or coaches, are normally scouted through international agents; however, Ricardo came to Korea through the introduction of a coach at Hyundai whom he knew personally. After knowing that the team would recruit a Brazilian coach, he did not hesitate to come to Korea, partly because the annual salary was high, and partly because he had wanted to visit Korea at least once. His particular profession is often called a "fitness specialist" or "physical trainer." In Brazil, professional football teams have such specialized coaches, who play important roles in this industry.

Many professional immigrants consider Korea to be a "place to go through." In particular, football players and physical trainers are thought to gravitate toward European teams if their skills are excellent. However, they do not think it is a bad idea to stay in Korea for a short time because their profession requires them to accumulate ability and experience. More than 200 professional football teams are in Brazil, whereas only 16 teams are in Korea. Four or five professional coaches are needed for each team, but even so, becoming a coach in Brazil is difficult if one's skills and experience are not strong enough. In addition, it is regarded as positive if the career and professional technology accumulated in Brazil can be used, but doing this is difficult because Korea's football culture is different from that of Brazil. Ricardo observed that Korean football players were required to run on the football ground longer than usual the next day after losing a game as a sort of "punishment," which is also considered "more reinforced training." However, Brazilian football players are physically trained as usual in preparing for the next game if they lost a game despite their best efforts.

Brazilian coaches and trainers have to "tolerate" the cultural differences as long as they are in Korea, keeping in mind

<sup>1</sup> Except for cases in which we were allowed to use real names, such as Ricardo, all of the names used in this paper are pseudonyms.

that they will go back to their home country and establish themselves there. In this way, they adapt properly to the Korean sport culture while at the same time trying to use their professional knowledge, but within the limits that Korean society allows. Ricardo said, "If I were doing this job in Brazil, I would be able to work more 'freely.' I would be very forthright about expressing my opinion and would try to strengthen the players' physical strength in my own way. However, they do not want my way in Korea. I need to yield to some extent." Some coaches he knows left for Brazil prior to the expiration of their contracts. Ricardo is willing to consider a contract extension after he has fulfilled the terms of his contract, but, he noted, only if this is helpful to his career. He said that it would not be a major problem because he regards Korea as merely a place to stay for a short time, although accommodating the Korean hierarchy is difficult. By using such a strategy—that is, "maintaining an appropriate distance"—such professionals stay in Korea for two years or perhaps for as long as four years.

### *3.2 Korean Hierarchy and Networks*

One of the cultural characteristics that Latin American professionals experience in Korean society is the hierarchical relationship in the workplace. This hierarchical relationship affects the social networks they can make with Koreans. For example, Ricardo described the relationships between Korean colleagues and their superiors as follows.

"The thing that is important in Korea seems to be age. There are a total of thirteen football clubs in K-League, and there were Brazilian coaches on nine of the teams last year. However, only five remain now. The others left for Brazil before the expiration of their contracts. They left Korea because they could not tolerate the cultural differences. It seems that what we think is important for a coach is different from what is emphasized in Korea. The value of Brazilian coaches was not recognized because of their age, and at the same time, their professional knowledge was not taken into account."

As a case in point, a 55-year-old trainer in a Korean football club is allegedly respected only because he is old and despite the fact that he has no "new techniques." Ricardo said he believes that simply being older is not good enough because trainers need to continue to study and acquire new skills. He said that Korea will probably end up with no good coaches if it continues to follow this path.

Ricardo said he thinks that his failure to command recognition in his workplace is due to his relative youthfulness, despite his professional knowledge and skills. For example, initiating a conversation with the head coach is difficult for him. The head coach calls Ricardo to tell him what he wants, and then, the meeting is ended. If Ricardo has something to tell the head coach and asks for a face-to-face meeting, he receives the answer of "later." It is evident that even professionals who come to Korea with professional knowledge of Brazilian football are constrained from doing what they want in Korean society, where authoritarianism is so strong.

Besides Korea's authoritative culture, another factor that causes difficulties in forming networks with Koreans is the difference in the concept of "friends." For example, Gloria (a Spanish contract professor, unmarried) has lived in Ulsan for 10 years but has no Korean friends. Her everyday life is extremely concentrated on her work. Because she has lived in Ulsan for so long, she thinks she has adapted to everything there, to some extent, and she is familiar with the life, area, and people in Ulsan; however, the Koreans with whom she is acquainted are her colleagues at work, and she does not often meet other Latin Americans because they are married. Meanwhile, Mexican communities have formed in Korea, but she does not attend the meetings often because they are held mainly in Seoul. The Latin Americans of her acquaintance who have jobs are all Spanish instructors at colleges, and some of them have come to Korea through private companies on short-term contracts (three to four months). In addition, a considerable number of the Mexican women around her live in Korea because they married Korean men, and most of them are housewives.

Most of the professionals form networks with people from their home countries; however, those who live in provincial cities cannot participate in the Latin American communities, which are concentrated mainly in Seoul. Gloria said, "If it were not for my work, living in Korea would be very hard for me. About 90% of my life is now associated with work. Time alone once a week is my only free time." To Gloria, relationships in the workplace consist of "keeping reasonable distance." This situation exists partly because the teachers do not have enough time with one another and thus have no opportunity to develop intimate relationships, and partly because Gloria's relationships with her colleagues have so far been related to work. In addition, she is not in the same ranking with her colleagues; she does not participate in administration or research as the Korean professors do. She is teaching Spanish only as a "native speaker," and her job has not changed for 10 years. For this reason also, she is treated differently from Koreans.

Gloria provided yet another reason why it is so difficult for her to make friends with her colleague professors even though she could have formed relationships with them because she had worked with them for so long. She added, "I've lived here for a long time, but things are as unfamiliar to me as before and my thought that I am a stranger has not changed." However, she said that her experience as a stranger changed when she began to attend a Catholic church. "At the moment I found a Catholic church, I felt I was accepted in Korean society." However, the Catholic church did not prove to be the place that could help her to form relationships permanently. She needed to participate in more activities than simply going to church every Sunday to maintain her relationships, and she naturally grew away from the church due to the limits of her Korean. She sought the possibility of socio-cultural adaptation in religious life, but religious institutions do not necessarily form social networks, as the relationships there tend to remain formal.

Among Latin American professional migrant workers, musicians usually rely on agencies and do not need much



communication with Koreans. In many cases, the number of Koreans they know is very limited despite the fact that they have been in Korea for several years. In addition, we found that Latin American professionals do not see the necessity of social relationships in their community, as it is very limited. Not many Latin American lecturers exist, for instance, whereas English lecturers form virtual communities, including several cyber cafes, exchange and share information through them. In summary, Latin American professional immigrants, who are not large in number, have difficulty solving the problem of socio-cultural adaptation individually partly due to the language barrier and partly due to the difficulty with forming networks with other Latin Americans in Korea.

### 3.3 Being “White” or “Indian”: Racial Reassignment of Latin Americans in Korea

Aside from the aspect of social networks, another characteristic of Latin American professionals’ immigration experience and adaptation strategies is that they newly recognize their own racial identity. In this section, we investigate how racial identity is recognized in Korea, focusing on those professional immigrants in Korea who are Spanish instructors and those who have culture and arts or entertainment residence visas. With the phenomenon of immigration, culture can now move freely across territories without being geographically limited. Immigrants move into territories with their own cultures and commercialize the new cultures. In this section, as one example, we look at cultural artists, especially those participants who play so-called “Indian music.” In addition, we use the example of Latin American professionals related to Spanish education, who account for the largest number of immigrant professions except for the Brazilian professionals who are in the field of energy industries, examining their experience and the adaptation strategies they use in Korea.

Miguel, who worked mainly as a Spanish instructor in Korean high schools and colleges for about 20 years until he recently found another job, emphasized that he is still a “foreigner” even though he has lived in Korea for a long time. He pointed out that he cannot be treated as a White and that he does not belong to the visible category culturally speaking. Miguel also mentioned that he himself thinks that he is from the “West,” but Mexico is not considered part of the West in Korea. He added that Koreans are “indifferent” to him. In other words, Mexicans are essentially “invisible” foreigners. In addition, Gloria, who was mentioned above, also relies on comparisons with Latin Americans from the countries around Mexico to help people to recognize her home country, Mexico. She said that Koreans are moderately knowledgeable about Mexico, adding that they would not know much about Guatemala. In other words, they are experiencing Korea by considering Mexico’s position both in the world and in Korea.

Miguel married a Korean woman and has two children, and he is familiar with Korea—enough to say confidently, “I know all the history of Korean society over the past twenty years.” He may think that he has assimilated into Korea after having lived there for 20 years, but he is not good at Korean because he did not really need to learn it. He continuously taught Spanish at high schools and colleges before recently obtaining a job as a Spanish-speaking consultant for a company in the city where he lives. According to him, he did not learn Korean because the schools instructed him to use only Spanish in school and class. After that, he had no opportunity to learn Korean, but he can live in Korea without any particular difficulty as an English speaker.

Erica, a Spanish instructor at a private foreign language institute in Busan, was a flight attendant in Peru, changing her occupation after she moved to Korea. She selected the job as a Spanish instructor because she could not use her other knowledge and skills in Korea. She married a Korean man and has lived in Korea for one and a half years, but her network includes only the instructors from Uruguay and Mexico whom she has met in the workplace. She could form a network with other Latin Americans, as she worked in a private foreign language institute. The Koreans of her acquaintance are her Korean family and students at the institute. She is proficient in English as well as in Spanish, and she is planning to work as an English teacher at an English kindergarten. She said, “As I am a white, I will have no problem even though I become an English teacher,” adding that it would be easier for a “White” to find a job than a “Latin American.” In recognizing the concepts of racial identity in Korea, Erica understands well that racial reassignment is beneficial in the professional labor market.

In contrast with the above so-called “invisibility” that education professionals experience, the musician participants are visible, as they use indigenous costumes to reproduce aboriginal culture in performances and at folk flea markets. Their employment status is also relatively unstable compared with that of education or other professionals. They can work a total of only about eight months out of a year because they offer mostly outdoor performances mainly at stations, festivals, and regional events, and there are fewer jobs in the winter. The two groups of musicians whom the researcher met are made up of brothers from Ecuador and Peru and one friend, and cousins and two friends, respectively. They came to Korea with their brothers or cousins and are living together in Korea.

Luis (who has stayed in Korea for five years) is an Ecuadorean Andes performing musician in Korea. His group is composed of three people, including one friend and one brother. He brought his wife and daughter to Korea, and they sell Ecuadorean handcrafts when playing music at festivals and other events in addition to performing their *musica nativa* (native music). He vaguely dreamed of returning to his home country, saying “It is five years since I have lived here. Won’t we be able to go back to our home country (*para alla*) within one or two years?” Before coming to Korea, they played music in other countries as well as in their home country. Luis even played in Europe for three years but went back to his home country owing to problems with living expenses. They contacted an advertising agency after seeing an advertisement seeking “Latin American performing musicians” and then came to Korea.

Luis plays Andean music in a designated place at regional festivals. In addition to performing the music, he also sells Ecuadorean musical instruments, costumes, and handcrafts in a small shop. He is not good at speaking Korean, but his wife has learned Korean better because she is the main one who runs the shop, and she needs to speak Korean when she sells handcrafts. In this regard, they have chosen the “essential” adaptation to Korea, like the unskilled workers discussed by Kim et al. (2008). They are living by adapting to Korea’s cultural market through the commercialization of their own culture and by adapting to the way of life by learning Korean. Like most of the musicians, they visit their home country during the slow season each year, bringing back Ecuadorean handcrafts each time they return to Korea.

When Latin American musicians deliver musical performances at subway stations or railroad stations, as well as at various events or festivals, and reproduce a part of indigenous culture, like “Andean music,” they do this to reproduce indigenusness in the Korean context. Korean society sees “native Latin Americans” simply as “Indians,” even when they play music in Apache Indian costumes, and the distinction between North America and South America is not deemed important. In this case, the cultural identity is relatively clear, compared with the vague positioning of Latin Americans. That is, Latin Americans are not considered to be “Whites” in Korea, such as Miguel or Gloria, as they regard Mexicans. Therefore, Koreans as “visible” or “marked” immigrants compared with Anglo-Americans. The immigrants’ visibility is subject to each country and to the relationship between the host country and the migrants’ country, as Leinonen (2012) showed in her study of white American expatriates in Finland. For example, White Americans are located in various domains of immigrant visibility in Finland—for example, with one domain including those who are visually identified as immigrants—and at the level of public and academic discussions on immigration.

In this respect, musicians differ from other Latin American professionals in Korea, who recognize their positions as “being invisible” in many cases. The musicians are regarded rather as “being visible” because they professionally take charge of informing Koreans about their own culture in the public space. Nevertheless, in reality, musicians actually can be more “invisible” than the professionals in charge of Spanish education are because the range of their activities in Korea is extremely limited except for their performances.

#### 4. Conclusions

Despite the fact that a need for or interest in foreign professionals in Korea is currently increasing, empirical studies on this topic are scarce thus far. The aim of this paper is to describe Latin American professional immigrants’ experiences and the adaptation strategies in Korea, by means of in-depth interviews, unlike the generalizations made in previous studies on foreign professionals. As a result of an investigation into the type of relationship that Latin American professionals have with Korea’s sociocultural characteristics in their immigration experiences, it was found that they employ adaptation strategies, such as the formation of limited social networks and the reconstruction of their racial identity.

Unlike previous studies on immigration that have focused on immigrants from Asia and unskilled workers (Kim & Oh, 2012), this study showed that Latin American professionals experience Korean society in a relatively different way and that how they express themselves also involves distinct characteristics. For those involved mainly in organizational life, such as in sports, the Latin American professionals who are not familiar with the Korean hierarchy perceive a cultural difference. In addition, making social networks is difficult for them. The education-related professionals have difficulty with forming networks because they are categorized as “temporary employees” in comparison with Korean professors, no matter how long they have worked. Musicians suffer from a lack of job security and have occupational characteristics that make it difficult for them to construct networks outside of close relationships with their managers. In addition, they participate in the commodification of the racial identity that Koreans have constructed. I attempted to illuminate looking at the adaptation of the Chinese students to British education systems, by illustrating how the professional immigrants as a ‘group’ negotiate the terms of their relationship to Korea and to their workplace.

The history of exchanges between Korea and Latin America is not long, and they have no shared culture due to the physical and cultural distances between the two countries (Joo, 2012; Ortiz, 2011; Kwak 1998). However, with the increasing trade with Latin America owing to Korea’s recent global strategies, more transnational mobility might increase, occupying various areas of professions in Korean society. This study has limitations in terms of limited data, mostly from qualitative interview. Future studies should include more professionals from other occupations ~~in the future~~. In addition, a comparison between professional immigrants from Latin America with those from other countries may lead to a better understanding of Korea’s transnational landscape in this global era.

#### Acknowledgements

This work was supported by the Korean Institute of Economic Policy (KIEP) and the Presidential Research Fund (project No. 1.170066) of the Ulsan National Institute of Science & Technology (UNIST).

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#### Source from Institutions

Korean Immigration Service (2016). Tongkyeyunbo (National Statistical Data)

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# Job Satisfaction among Academicians at Business Colleges Operating in Kuwait

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Received: September 24, 2017

Accepted: October 13, 2017

Online Published: November 28, 2017

doi:10.5539/ass.v13n12p9

URL: <https://doi.org/10.5539/ass.v13n12p9>

## Abstract

The purpose of this study is to examine the overall level of job satisfaction of the academicians who work for business colleges operating in Kuwait and to identify whether demographics affect the level of job satisfaction.

During the period between December 2016 and March 2017, a short-form Minnesota Satisfaction Questionnaire (MSQ) was distributed to 240 academicians working for eight Kuwaiti business colleges including: Arab Open University (AOU), American University of Kuwait (AUK), Gulf University for Science and Technology (GUST), Australian College of Kuwait (ACK), Public Authority for Applied Education and Training (PAAET), Box Hill College (BHC), Kuwait University (KU) and the American University in Middle East (AUME). A total of 141 questionnaires were returned; resulting in 59% usable response rate.

The study showed that academicians in business colleges operating in Kuwait are relatively job satisfied and their characteristics impact the level of their satisfaction. However, the most significant characteristics that affect the level of their job satisfaction were income, nationality and gender.

The outcome of this study can be used by policy makers to develop recruitment and promotion policies. This would assist in achieving high levels of job satisfaction and will have positive effect on the academic process and the higher education system at large. This is the first study that used MSQ to explore job satisfaction among academicians who work for eight business colleges in Kuwait. The outcome of the study is expected to help decision makers in enhancing the level of the academicians' job satisfaction.

**Keywords:** Job satisfaction, Academic staff, Minnesota Satisfaction Questionnaire, Factors affecting job satisfaction, Business colleges, university, Kuwait

## 1. Introduction

Job satisfaction is an important issue that organizations aspire for their employees. It reflects the extent to which an employee is pleased with his/ her job. The level of satisfaction is influenced by employee's perception and the feelings about the job. The level of employee satisfaction can be also influenced by employee's characteristics and the job nature. As far as university academic staff is concerned, empirical research pointed to several factors that influence their level of job satisfaction including the work itself, department heads' behavior, pay and promotion. A negative relationship is detected between academic employees' job satisfaction and job stress (Shamra & Manani, 2012). The findings of previous empirical research would be inapplicable to the academic staff of business colleges operating in Kuwait due to the high education environment in Kuwait. The higher education system in Kuwait has the liberty to adopt different education system. Although the only state university (Kuwait University) and the college (Public Authority for Applied Education and Training) adopt the American system of education with some variations to accommodate the Kuwaiti culture and Arabic language, the remaining private universities adopt different education systems including the American, British and Australian systems of education. Consequently, work environment in terms of the curriculum, teaching methods and assessment methods, staff recruitment, compensation and promotion policies are not identical in these universities. Hence, the level of academic staff satisfaction is expected to vary among these universities. It is, therefore, important to study academic staff satisfaction in these universities. The importance of this study stems from the fact that academic staff satisfaction or otherwise is likely to influence the lecturer performance and this in return has a major effect on the outcome of the education process and the objective of the higher education system at large. Exploring job satisfaction among academicians identifies areas that need to be developed and this would assist policymakers in formulating their academic staff recruitment, retention, compensation and promotion policies to ensure minimum absenteeism, turnover and increase their productivity. This would have a positive effect on the business higher education process and assist in achieving the objective of the country's higher education system. The rest of this paper is organized as follow. Related literature and previous studies are reviewed in the next section. Research method adopted for this study is described in section three. While the findings of the study

are presented in section four, the conclusion is offered in final section.

## 2. Related literature and previous studies

Different definitions have been used in the literature to describe job satisfaction. According to Webster's Dictionary (1986), job satisfaction refers to how well a job serves as a source of enjoyment. Robbins *et al.* (2003) defined job satisfaction as an individual's general attitude toward his or her job. Rothman and Cooper (2008) defined job satisfaction as a pleasurable state ensuing from the appraisal of one's job. Steyn and Van (1999) considered job satisfaction as strong predictor for an individual to decide to stay or leave the organization. Although there is no universal identical definition for job satisfaction, job satisfaction is the reaction to a job that results from comparison between actual outcomes with those that are desired (Oshagbemi, 2003). Shamra and Manani, 2012 believe that job satisfaction has a significant effect on absenteeism, turnover and job performance. Mehmood *et al.* (2012) also revealed that job dissatisfaction is among the best predictors of staff turnover.

The literature pointed to three major theoretical frameworks of job satisfaction. **The first one** is content theory. It assumes job satisfaction takes place when individual's need for growth and self-actualization are come together by an individual's job (Saif *et al.* 2012). **The second one** is process theory that attempts to explain job satisfaction by looking at how well the job meets one's expectations and values. It proposes that individuals select their behavior in order to reach their needs. In other words, process theories identify relationships among variables that make up motivation (Teck-Hong & Waheed, 2011). **The third one** is situational theory proposes that job satisfaction is a consequence of how well individual's personal characteristics interact with the organizational characteristics. The situational theory depends upon two factors: situational characteristics and situational occurrences. Situational characteristics are things well known by the employee before accepting the job such as pay; while the situational occurrences are things that occur after taking a job. They might be positive or negative occurrences. Therefore, job satisfaction is a product of both situational factors and situational occurrences.

Based on the above theories, several studies have developed to identify factors behind job satisfaction among academic staff. They were undertaken in various places (see for example, **UK**: Oshagbemi, 1996, 2000, 2003, Ward and Sloane 2000, Stevens 2005; **Canada**: Leckie and Brett 1997; **Turkey**: Kusku 2003, Bayram *et al.* 2010, Toker 2011, Saygi *et al.* 2011; **Uganda**: Sseganga 2003, Sseganga and Garrett 2005, **Malaysia**: Santhapparaj and Alam 2005, Noordin and Jusoff 2009, Hashim and Mahmood 2011, Mustapha 2013, Ahmad and Abdurahman 2015; **South Africa**: Schulze 2006, Basak, 2014; **USA**: Bendern and Heywoodn 2006, Baldwin 2009, Leysen and Boydston 2009; **Zimbabwe**: Chimanikire *et al.* 2007; **Iran**: Zarafshani and Alibaygi 2008; **Cyprus**: Eyupoglu and Saner 2009; **Pakistan**: Saba 2011; Malik 2011, Khalid *et al.* 2012, Mehmood *et al.* 2012, Sohail and Delin 2013, Syed and Ahmedani 2013; **India**: Shamra and Manani 2012; **Jordan**: Abushaira 2012; **Vietnam**: Wang *et al.* 2014; Shin and Jung 2014<sup>1</sup>). The following section will review in brief these studies.

Oshagbemi (1996, 2003) examined job satisfaction among academicians who work for 23 British universities. He found that academicians are satisfied with teaching, research, and interactions with colleagues. He also found that academicians are only moderately satisfied with department heads' behavior and physical working conditions. He observed that academicians are dissatisfied with pay, promotion, and performance of administrative duties. Oshagbemi concluded that the rank of an individual and the length of service he/she has worked within higher education are significant predictors of the level of the individual's overall job satisfaction. Another study performed by Ward and Sloane (2000) who measured job satisfaction of 900 academicians from five traditional Scottish Universities. They found women generally express themselves as more satisfied with their jobs than men. They also found that levels of overall job satisfaction among academicians are high. Ward and Sloane observed that job satisfaction generally declines with level of education. Stevens (2005) measured job satisfaction of English academicians in UK. He found insignificant difference in job satisfaction of male and female academicians. He also found that professors are on the whole happier in their jobs than lower grades. Stevens observed that the impact of experience on quits declines for the first thirteen to seventeen years and remains negative until experience hits the mid to late twenties.

Leckie and Brett (1997) examined job satisfaction of Canadian university librarians. They found that academic librarians are satisfied with the traditional elements of librarianship itself a strong emphasis on service, independence, creativity, using one's judgment, and participation in professional activities. They also found academic librarians are more satisfied with the promotion and tenure process and with support for doing research. However, Leckie and Brett observed that academic librarians are insignificantly satisfied with their assigned duties, workloads and relationships with users and colleagues.

Kusku (2003) explored differences in satisfaction dimensions between academic and administrative employees in Turkey. She noticed certain differences in factors such as "colleague relations satisfaction", "colleague competition level satisfaction", "other work group satisfaction", "professional satisfaction", "work environment satisfaction", and "salary satisfaction". Bayram *et al.* (2010) examined the degree of burnout and vigor experienced in an academic environment and the relation of these factors to job satisfaction in Turkey. They found the highest scores for burnout were those of the academicians in the health sciences department. They also observed 22 percent of the variance in job

<sup>1</sup> This study explored academics job satisfaction and job stress across 19 countries including Argentina, Australia, Brazil, Canada, China, Finland, Germany, Hong Kong, Japan, Italy, Korea, Malaysia, , Mexico, Netherlands, Norway, Portugal, South Africa, UK, USA.

satisfaction is explained by burnout and intrinsic job satisfaction was more important than burnout. Bayram *et al.* concluded that female academicians are more vulnerable to developing burnout than males. Another study conducted by Toker (2011) who used MSQ to examine the levels of job satisfaction among academicians in the universities of Turkey. He found social status ranked as the highest and compensation as the lowest of the examined items. He also found professors reported a higher level of job satisfaction as compared to instructor and research assistants. Toker concluded that marital status and gender are not significantly related to job satisfaction. An additional study conducted in Turkey by Saygi *et al.* (2011) who demonstrated that the most important factor in job satisfaction is coworkers, working as a team and sharing also rated as important. They observed insignificant differences in factors rating according to gender.

Sseganga (2003) examined factors that contribute to academic satisfaction and dissatisfaction in higher education in two Ugandan universities. He found that the factors most prevalent in the prediction of dons' satisfaction relate to co-worker behavior, supervision and intrinsic facets of teaching. He also found that extrinsic factors with respect to remuneration, governance, research, promotion, and working environment are factors that create academic dissatisfaction. Sseganga presented no evidence to support gender influence on dons' job satisfaction. Another study undertaken by Sseganga and Garrett (2005) showed academicians rated satisfaction is derived from intrinsic factors of teaching like interest shown by students in courses taught and autonomy of content taught suggesting that Ugandan academicians are sociable beings and value their friendly interactions. Sseganga and Garrett added that academicians are not satisfied with salary, research grants and library facilities.

Santhapparaj and Alam (2005) examined the relationship between pay, promotion, fringe benefits, working condition, research support, teaching support, gender and job satisfaction of academic staff in private universities in Malaysia. They found pay, promotion, working condition and support of research have positive and significant effect on job satisfaction. They also found female staff to be more satisfied than their counterpart. Another study conducted by Noordin and Jusoff (2009) to examine job satisfaction of academic staff of a public university in Malaysia. They found overall academic staff of the university to be moderately satisfied. They also found the current status, marital status, age and salary to have significant impact on the respondents' level of job satisfaction. Noordin and Jusoff provided evidence that the male respondents have a significantly higher level of general satisfaction than their female counterparts. Hashim and Mahmood (2011) investigated job satisfaction of academic staff from both public and private universities in Malaysia and found that they are satisfied with the overall job contents and contexts of their job. They observed that academic staff of both universities has ranked "salary" as being "least satisfied". Hashim and Mahmood concluded that there are other variables such as consultancy work, variety of jobs and governance also play important role in increasing job satisfaction.

Another study performed by Mustapha (2013) who examined financial reward effect on job satisfaction among lecturers in four public universities. He found a positive relationship between financial reward and job satisfaction. Mustapha recommended that organization should consider financial reward as one of the factors in promoting job satisfaction among employees. Recently, Ahmad and Abdurahman (2015) examined the level of job satisfaction among lecturers at one of the public universities in Malaysia. They found most participants have moderate level of job satisfaction and lecturers are satisfied with the work environment. Another recent study by Mehrad *et al.* (2015) examined the role of job satisfaction among university academic staff. They found the existence of job satisfaction as basic human needs can develop and support academic staff's performances and conduct their organizational behavior in an accurate manner.

Schulze (2006) used a questionnaire survey to examine job satisfaction in higher education in South Africa and found academicians are in general satisfied. He also found that job satisfaction has the highest correlation with physical conditions and support, research and thereafter compensation and other benefits offered by the university. He observed factors that caused dissatisfaction include government interference in teaching; poor quality of students' work and lack of time to do research. Schulze concluded that improvement in job satisfaction among academicians could be achieved by increasing availability of research assistants, research support and organizing workshops to improve academicians' research skills. Another study conducted by Basak (2014) found satisfaction factors are more than dissatisfaction factors and university academics are more satisfied than dissatisfied.

Bender and Heywoodn (2006) surveyed determinants of job satisfaction of PhD-level scientists in the United States for both academic and nonacademic sectors. They found that while academic scientists with tenure have substantially greater job satisfaction than nonacademic scientists, academic scientists without tenure have the similar levels of job satisfaction as non-academic scientists. They also found female scientists have lower job satisfaction than males in the academic sector but higher level of job satisfaction in the non-academic sector. Bender and Heywoodn observed that women, who may be more likely to demand flexible jobs, would be more satisfied than men. They further noticed that job satisfaction is directly related to income within the sector, while comparison across sectors does not affect job satisfaction. Another study conducted by Leysen and Boydston (2009) who measured job satisfaction among academic cataloger librarians and found the majority of academic cataloger librarians are satisfied with their current job and they would make the same career choice again. They also found cataloger librarians are satisfied with the benefits package, relationships with coworkers, and opportunities to learn new skills. Leysen and Boydston observed that catalogers wanted to be treated fairly, be asked about matters directly linked to their job and have their thoughts appreciated and

considered.

Another study conducted by Baldwin (2009) who used a questionnaire survey to examine job satisfaction of men and women administrators in higher education in four-year public institutions in Alabama. He found administrators are satisfied in terms of present job duties, pay, opportunities for promotion, and supervision. He also found administrators expressed a level of dissatisfaction with the people with whom they work and their job in general. Baldwin observed male administrators as being more satisfied with their work climate than the female administrators.

Chimanikire *et al.* (2007) examined factors affecting job satisfaction among academic professionals in tertiary institutions of Zimbabwe. They found the majority of the academic staff are not satisfied with their jobs. The reasons for dissatisfaction were high volume of work and insufficient salaries. Chimanikire *et al.* concluded that there is a need to introduce incentive package that addresses the concerns of academic staff on issues related to job satisfaction.

Zarafshani and Alibaygi (2008) used modified version of the MSQ to examine job satisfaction among academic staff of Razi University in Iran. They found faculties are satisfied with their jobs in general. However, they are more satisfied from intrinsic factors such as social service, activity, and ability utilization and least satisfied from the extrinsic job satisfaction dimensions such as salary, university policy and job security. Zarafshani and Alibaygi concluded that as an attempt to motivate faculties to stay, they should realize that their effort is appreciated first then they should be provided with superior monetary compensation and improved job security.

Eyupoglu and Saner (2009) used a short-form MSQ to examine levels of job satisfaction among academicians in North Cyprus. They found academicians enjoy a moderate level of overall job satisfaction. They also found university policies and practices and compensation are clearly responsible for dissatisfaction. Eyupoglu and Saner provided evidence that moral values, social service, creativity and achievement are responsible for satisfaction.

Saba (2011) examined job satisfaction level of academic staff in Pakistan. He found academic staff of the colleges are more satisfied with the work itself, pay, working conditions, job security and coworkers and less satisfied with promotion opportunities. He also found teachers are satisfied with their coworkers because they cooperate with them and also provide them sufficient supports whenever they need them. Saba provided evidence to support that young teachers find the salary level in public institutions very attractive and find it very reasonable when compare it with their qualification. Malik (2011) added that the faculty members are generally satisfied with their jobs and male faculty members are less satisfied than female faculty members. He also observed that “work itself” is the most motivating aspect for faculty and “working conditions” is the least motivating aspect. Malik concluded that demographic characteristics such as age, years of experience, academic rank, degree are negligibly related to overall job satisfaction. Another study conducted by Khalid *et al.* (2012) examined the relationship between various facets of job satisfaction among university academicians in Pakistan. They found pay differential exists between private and public universities in Pakistan and observed that academicians in private universities are more satisfied with their pay, supervision, and promotional opportunities than academicians in public university. Khalid *et al.* concluded that academicians in public universities are found more satisfied with co-worker’s behavior and job security.

Another study performed by Mehmood *et al.* (2012) who noticed a relationship between employees job satisfaction and their salaries and benefits, working conditions, and autonomy. They also noticed work environment is a predominant factor that effects the level of satisfaction. Mehmood *et al.* concluded that the organizational setup improve the satisfaction level of employee and increase in performance. Sohail and Delin (2013) added that Job security and co- worker relation have major impact on employees' satisfaction. Syed and Ahmedani (2013) used a questionnaire survey to compare job satisfaction among faculty members of University of Sindh with Shah Abdul Latif University Khairpur Mirs. They found that job satisfaction is determined by a summation of many attitudes possessed by an employee concerning the job and other contextual factors. They observed that the teaching staff of the University of Sindh-Jamshoro is highly satisfied with their job when compared to the teaching staff in Shah Abdul Latif University Khairpur Mirs.

Shamra and Manani (2012) tested factors affecting job satisfaction among head teachers in India. They found that the main factors are work conditions, supervision and relationships. They observed that work itself, and advancement explained 60 percent of the variance among faculty members overall level of job satisfaction. Shamra and Manani concluded that job satisfaction is negatively related to job stress.

Abushaira (2012) looked into job satisfaction among teachers in Jordan and found their level of job satisfaction was moderate. He also found significant differences in the respondents’ level of job satisfaction due to age favoring younger teachers. He could not find a relationship between job satisfaction and gender. Abushaira suggested the necessity of providing an appropriate work atmosphere to encourage the teachers who work with the multi-disabled students.

Wang *et al.* (2014) examined factors that are closely associated with job satisfaction of employees working at job consulting center in Vietnam. They found factors such as administration, working condition and staff interaction have the strongest impact on the overall satisfaction. They also observed that the organization operates effectively only if teacher and staff can self-recognize themselves as important resources that have scarified all their life for the development of working place. Wang *et al.* concluded that the compensation is a central component of effective policy-making.

In a comprehensive study of academicians' job satisfaction and job stress across 19 countries, Shin and Jung (2014) employed regression analysis to assess whether new public management affects job satisfaction or job stress. They noticed that while European countries are in the high satisfaction group, countries driven by strong market are in high stress group. In other words, while market oriented managerial reforms appeared to be the main source of academic stress, academicians' high social reputation and their autonomy are the main source of job satisfaction. The result of the regression analysis undertaken by Shin and Jung (2014) revealed that performance-based management is the main source of academic job stress. They also reported that while high satisfaction is associated with higher education systems, it also has high stress groups.

As far as the GCC region is concerned, a limited number of studies were undertaken to examine factors affect academic staff job satisfaction (see for example, **Kuwait**: Bader, 1983; **Oman**: Zayed, 2008; **Saudi Arabia**: Al-Rubaish *et al.*, 2009). The following section reviews in brief these studies.

Bader (1983) adopted a questionnaire survey to examine job satisfaction among staff and administrators in Kuwait University. He found faculty members and administrators are highly satisfied in relation to their supervisor and co-workers and fairly satisfied with subordinates work planning, job position accomplishment and working hours. He also observed that academicians and administrators are less satisfied in relation to promotion opportunities, decision-making and advancement and are dissatisfied with respect to other fringes and benefits such as housing. Bader found insignificant relationship between job satisfaction and material status, age and gender.

Zayed (2008) investigated the relationship between job satisfaction and variables such as gender, qualification, marital status, and years of experience of Omani physical educators working at governmental schools. He found the majority of participants are moderately satisfied. He provided evidence that the most important factor affecting job satisfaction is the finance income, whereas the majority of participants are either dissatisfied or slightly satisfied with their salaries. Zayed concluded that the educators who have less than five years of service are more satisfied than their counterparts who have more than five years of service and married physical educators are less job satisfied than singles physical educators.

Al-Rubaish *et al.* (2009) examined the state of job satisfaction among the academic staff of King Faisal University. They found most academic staff are fairly satisfied with their jobs and job satisfaction varied widely across job domains and demographic characteristics. They also found that all categories of staff are most dissatisfied with their salaries and females were significantly less satisfied than their male counterparts. Al-Rubaish *et al.* concluded that the overall job satisfaction rate among university academic staff in Saudi Arabia is fair in comparison with some studies from other countries.

It is evident from brief review of the literature that little research has been undertaken in the area of job satisfaction among university academic staff in the GCC countries. This suggests the need for empirical testing in different environmental contexts of country and time to enhance understanding of job satisfaction among academicians at business colleges operating in Kuwait. This provides clear justification for this study.

## 2. Study Methodology

### 2.1 Research instrument

The current study is based on a short-form Minnesota Satisfaction Questionnaire (MSQ) to measure job satisfaction of the academicians (Weiss *et al.*, 1967)<sup>2</sup>. The questionnaire consisted of twenty facets and each facet represented one satisfaction item. It is one of the most commonly used tool in measuring job satisfaction (Eyupoglu and Saner, 2009) and its validity and reliability have been confirmed for more than 45 years of application. It has been employed to measure job satisfaction of academicians in several places and it has the adaptability advantage. During the period between December 2016 and March 2017, a translated version of the questionnaire was distributed to 240 academicians working in eight Kuwaiti business colleges. 141 questionnaires were returned; resulting in 59% usable response rate. A summary of their response is presented in table (1).

Table 1. Respondents response rate

Academic Institution	Number of questionnaires distributed	Number of questionnaires returned	Response rate (%)
Arab Open University	30	17	57
American University of Kuwait	30	17	57
Gulf University for Science and Technology	30	16	53
Australian College of Kuwait	30	17	57
Public Authority for Education and Training	30	21	70
Box Hill College	30	25	83
Kuwait University	30	21	70
American University of the Middle East	<u>30</u>	<u>7</u>	<u>23</u>
Total	<u>240</u>	<u>141</u>	<u>59</u>

<sup>2</sup> The long-form MSQ consists of 100 items, which make up 20 scales/facets of the job.



The questionnaires were then entered in an SPSS file for analysis. Cronbach's Alpha test was used to measure the internal consistency of the collected data. Descriptive statistics have been utilized to shed some light on the respondents and their response to various items of job satisfaction. Backward regression analysis was performed to identify the most significant academicians' characteristics that determine the level of job satisfaction. The estimated regression model is summarized as follows.

$$JSAT = \beta_0 + \beta_1 NAT + \beta_2 UNIV + \beta_3 GEN + \beta_4 MARS + \beta_5 ACCR + \beta_6 WORE + \beta_7 LACQ + \beta_8 AGE + \beta_9 PLAQ + \beta_{10} INCO + \epsilon$$

Where:

- JSAT : Job satisfaction.
- $\beta_0$  : Constant
- $B_1 - B_{10}$  : Parameters of the model
- NAT : Nationality
- UNIV : University status whether public or private university
- GEN : Gender
- MARS : Marital Status
- ACCR : Academic Rank
- WORE : Work Experience
- LACQ : Last Academic Qualification
- AGE : Age
- PLAQ : Place Where the Last Academic Qualification Obtained
- INCO : Income
- $\epsilon$  : Standard Error

Backward regression is an elimination regression that starts with all variables employed to estimate the regression model. It then deletes the least significant variables until it gives the best-fit model with the remaining variables being statistically significant in estimating the dependent variable.

### 3. Findings

#### 3.1 Respondents background

Table (2) summarizes the main characteristics of the respondents who took part in the questionnaire. It can be observed in the table that the vast majority of the respondents (56%) are non-Kuwaitis and work for private universities (70%). This reflects the sample used in the current study that covers 8 business colleges, only two of them are governmental and the remaining are private colleges. While Kuwaiti nationals are dominant in the government universities, non-Kuwaitis are dominant in private universities. The vast majority (64%) is males and hold PhD (66%). In addition 56% of the respondents are married and almost 67% of them age between 25 and 50 years. Most of the respondents (64%) obtained their last academic degree either from American or British universities. This reflects the education policy of the Kuwaiti government that directs its scholarship on American and British universities. In addition, Kuwaiti universities whether governmental or private recruit American and British graduates since these universities offer their academic programs in English and adopt either the American or British system of higher education. One third of the respondents are in the lecturer rank. In general, lecturers hold masters degrees and they are involved in teaching general courses. 40% of the respondents to the questionnaire are in the rank of assistant professor; whereas, 12% and 17% of the respondents are associate and full professors respectively. Once again, this result is predictable since business colleges in Kuwaiti offer either two years Diploma or Bachelor degree. A limited number of these colleges offer Masters Degree (MBA). Academicians in the rank of assistant professor have enough knowledge and skills to teach on these programs; bearing in mind that almost 70% of the respondents have more than 5 years of work experience. What attracts attention in Table (2) is the salary scale of the respondents and the number of years passed since they attained the last promotion. More than 60% of the respondents earn more than KD 2,000 (almost \$7,000) monthly. In addition to the monthly salary, Kuwaiti universities offer non-Kuwaiti lecturers accommodation allowance, transportation, travel, internet, up to two children school fees and medical insurance. A significant proportion of the respondents (39%) indicated that they had attained their last promotion more than 6 years ago.

Table 2. Respondents Background

	Freq.	Percent		Freq.	Percent
<b>Nationality</b>			<b>Gender</b>		
Kuwaiti	61	43.3	Female	51	36.2
Non-Kuwaiti	<u>80</u>	<u>56.7</u>	Male	<u>90</u>	<u>63.8</u>
Total	<u>141</u>	<u>100</u>	Total	<u>141</u>	<u>100.0</u>

<b>Academic Qualifications</b>			<b>Marital Status</b>		
Masters	48	34.0	Single	47	33.3
PhD.	<u>93</u>	<u>66.0</u>	Married	<u>94</u>	<u>55.7</u>
<b>Total</b>	<b><u>141</u></b>	<b><u>100.0</u></b>	<b>Total</b>	<b><u>141</u></b>	<b><u>100.0</u></b>
<b>Academic Rank</b>			<b>Age</b>		
Lecturer	43	30.5	Less than 25 Years	1	0.7
Assistant Professor	57	40.4	Between 25-39 years	37	26.2
Associate Professor	17	12.1	between 39- 50 years	57	40.4
Full Professor	<u>24</u>	<u>17.0</u>	More than 50 years	<u>46</u>	<u>32.6</u>
<b>Total</b>	<b><u>141</u></b>	<b><u>100.0</u></b>	<b>Total</b>	<b><u>141</u></b>	<b><u>100.0</u></b>
<b>Place where last academic degree obtained</b>			<b>Year(s) since your last promotion</b>		
Arab countries	23	16.3	Less than one year	20	14.2
USA	56	39.7	1-3 years	42	29.8
UK	34	24.1	4-6 years	24	17.0
European other than UK	8	5.7	More than 6 years	<u>55</u>	<u>39.0</u>
Others	<u>20</u>	<u>14.2</u>	<b>Total</b>	<b><u>141</u></b>	<b><u>100.0</u></b>
<b>Total</b>	<b><u>141</u></b>	<b><u>100.0</u></b>			
<b>Salary</b>			<b>Years of work experience</b>		
less than KD 1,500	20	14.2	Less than 1 year	6	4.3
Between KD 1500-2000	36	25.5	1- 5 yeas	34	24.1
Between KD 2001-3000	67	47.5	6-10 years	36	25.5
More than KD 3000	<u>18</u>	<u>12.8</u>	More than 10 years	<u>65</u>	<u>45.1</u>
<b>University Ownership</b>					
Government	42	29.8			
Private	<u>99</u>	<u>70.2</u>			
<b>Total</b>	<b><u>141</u></b>	<b><u>100.0</u></b>			
<b>Total</b>	<b><u>141</u></b>	<b><u>100.0</u></b>			

#### Respondents' Level of Job Satisfaction

Before exploring the effect of the respondents' level of job satisfaction and the effect of their characteristics on the extent of job satisfaction, it was important to measure the internal consistency (reliability) of the collected data; Cronbach's Alpha ( $\alpha$ ) was performed and touched 0.929. In general, a commonly acceptable Cronbach's Alpha ( $\alpha$ ) is  $\geq 0.70$ .

Table (3) reports respondents' level of satisfaction with different aspects of their job. It is clear from the table that the respondents reached a relatively high level of satisfaction with all aspects included in the questionnaire except for advancement in their job as reflected by the reported means. Combining all aspects of job satisfaction together results in almost 68.42% overall score. In other word, if job satisfaction is defined as the extent to which the job meets the surveyed academicians' expectations, it satisfies 68% of their expectations. In addition to the advancement aspect of job satisfaction, the respondents appeared to be less satisfied with recognition, college policies and practices, supervision-technical, authority and variety. The result in similar to a conclusion reached by Bader (1983) who conducted a job satisfaction study in Kuwait University and found academicians are less satisfied with promotion opportunities, decision-making and advancement. The result is also in partial support of results achieved by Oshagbemi (1996, 2003) who found academicians in the UK are moderately satisfied with department heads' behavior and dissatisfied with promotion and performance. Furthermore, Eyupoglu and Saner (2009) observed that academicians in Pakistan are dissatisfied with promotion opportunities. The result is not surprising and reflects the Arab culture. For instance, in the Arab universities advancements in jobs is dodgy and promotion is influenced by personal and, in some occasions, by political factors. In Kuwait and other GCC countries, personal connections, rather than political considerations, play an active role in recruitment and advancement. Kuwait is a small society and they know each other closely. The weekly gatherings (deawaniat) that characterizes Kuwaiti society are playing an active role in facilitating the Kuwaitis daily aspects of life. Regular members of each of these gathering (dewaniah) are expected to help each other. Social status of the family of the lecturer who seeks promotion or the intermediary between the one who seeks promotion and the concerned body (college dean) could be more important in achieving promotion than what applicant for a promotion had achieved. In some cases, it is possible to have a head of department and a college dean with less academic qualifications and experience than many of his/ her subordinates. In this case, promoting faculty members means that they reached higher academic ranks than him/ her. Highly performed

academicians who feel that they stand a little chance of advancement in their job will be less satisfied and they will look for other universities that appreciate their academic performance. Hence, the university ends up retaining less performed academicians. This will lower the university's academic level and makes it difficult to achieve the main objective of the higher education system. To prevent this from happening, the head of department and the dean will put obstacles towards any academic advancement or promotion. To avoid this problem, clear guidelines about academic promotion would be spelled out in the college's policies and procedures. In addition, the promotion committee should be formed at the university level with representatives from all colleges. The members of the promotion committee should be in the rank of full professor. To ensure transparency and to achieve the highest level of quality control, the university can seek the help of external assessors from credible universities outside the country according to specialization. Hence, the promotion committee can rely on the external assessors report when making their final decision about the application of an academic staff for a promotion. By doing so, the university prevents ambiguity about promotion requirements and minimizes social pressure that might come from an influential personality or any other pressure groups. This is expected to enhance academicians' trust of the education system within their college and boost the level of their job satisfaction. The college will succeed in retaining good lecturers and this will achieve the main objective of the country's higher education system.

The respondents seem, however, to be highly satisfied with the social service and social status, independence, achievement and activity aspects of their jobs. This result is generally in line with Zarafshani and Alibaygi (2008), Eyupoglu and Saner (2009) and Toker (2011) who found academicians are satisfied with the social service aspect of job satisfaction. However, the respondents to the current study expressed moderate satisfaction with compensation, supervision, co-workers, authority and variety.

Table 3. The importance all participants attach to different items of job satisfaction

	Mean	Median	Std. Deviation	Rank
Ability utilization: The chance to do something that makes use of my abilities				
Achievement: The feeling of accomplishment I get from the job.	3.73	4.00	0.91	3
Activity: Being able to keep busy all the time.	3.65	4.00	0.98	5
Advancement: The chance for advancement on this job.	2.95	3.00	1.12	20
Authority: The chance to tell other people what to do.	3.23	3.00	0.99	16
Company policies and practices: The way university policies are put into practice.	3.19	3.00	1.01	17
Compensation: My pay reflects the work I do.	3.42	3.00	1.12	10
Co-workers: The way my co-workers get along with each other	3.28	3.00	1.07	13
Creativity: The chance to try my own methods of doing the job.	3.55	4.00	1.00	7
Independence: The chance to work alone on the job.	3.71	4.00	1.02	4
Moral values: Being able to do things that don't go against my conscience	3.51	3.00	1.04	8
Recognition: The praise I get from doing a good job.	3.16	3.00	1.15	19
Responsibility: The freedom to use my own judgment.	3.28	3.00	1.10	13
Security: The way my job provides for steady employment.	3.59	4.00	1.12	6
Social service: The chance to do things for other people.	3.81	4.00	0.88	1
Social status: The chance to be "somebody" in the community.	3.74	4.00	0.99	2
Supervision-human relations: The way my boss handles his/her workers.	3.32	3.00	1.15	12
Supervision-technical: The competence of my supervisor in making decisions.	3.16	3.00	1.07	17
Variety: The chance to do different things from time to time.	3.24	3.00	1.01	15
Working conditions	3.42	3.00	1.04	10

### 3.2 Level of Job Satisfaction and Respondents' Characteristics and the

The level of the respondents' job satisfaction and their characteristics is reported in Table (4). In terms of the respondents' nationality, the table showed non-Kuwaitis are more satisfied than Kuwaitis as reflected by the overall score of various aspects of job satisfaction. The table further shows academicians who work for private universities are more satisfied than those who work for governmental universities. In this respect, Khalid *et al.* (2012) found academicians in private universities are more satisfied with their pay, supervision, and promotional opportunities than academicians in public universities. The result is explained on the grounds that most of the academic staff in private universities are non-Kuwaitis. Hence, it is not surprising to see private universities academicians are more satisfied than governmental universities. Non-Kuwaiti academicians have many reasons to be satisfied. In addition to the relatively high salaries they earn, they benefit from accommodation allowance, children education, travel expenses, internet and utilities allowance. They further benefit from the low cost of living and zero income tax. Kuwaiti nationals are less satisfied than non-Kuwaitis due to nature of the disciplinary nature of the academicians' jobs. In other words, it is easy to identify whether a lecturer attended his/ her lecture or whether he/ she is available during the publicized office hours designed for students to consult their lecturer. This acts against the nature of the Kuwaitis who prefer flexible jobs that allows them to come and go whenever at their convenience.

Table (4) shows females and single respondents are more satisfied than males and married respondents. This result is explained on the ground that Kuwait as a conservative small country has limited job opportunities for non-Kuwaiti females since priority whether in the public sector or the private sector is given to the Kuwaiti nationals. Hence, females' qualified lectures are more likely to find decent jobs in private universities. Work environment in the Kuwaiti private universities are suitable for female lecturers since they are highly qualified and they do not face strong competition with local lecturers. In addition, the compensation package offered by private universities to lecturers in general, whether males or females, are compatible with regional or even western universities. Academic infrastructure in Kuwaiti universities, as well as all GCC universities are also compatible with top western universities and the revolution in information technology assist these lecturers to become active in conducting research. Finally, Kuwait has an advanced infrastructure. It is a secured country with high standard and a relatively low cost living and zero income tax. This result is in support of Ward and Sloane (2000) and Santhapparaj and Alam (2005) who observed women to be generally more satisfied than their males counterparts. Malik (2011) also noticed that male faculty members are less satisfied than female faculty members. In this regards, Noordin and Jusoff (2009) noticed marital status and gender to be significant determinants of job satisfaction. They, however, noticed that the males have a significantly higher level of general satisfaction than their female counterparts. Al-Rubaish *et al.* (2009) initiated that females were significantly less satisfied than their male counterparts. On the other hand, Stevens (2005) reported insignificant difference in the level of job satisfaction between male and female academicians. Similarly, Toker (2011) also reported insignificant relationship between job satisfaction and marital status and gender. Insignificant association between gender and job satisfaction also was observed by Saygi *et al.* (2011). Sseganga (2003) and Abushaira (2012) found no evidence to support the relationship between gender and job satisfaction. Similarly, Bader (1983) found insignificant relationship between job satisfaction and material status, age and gender. Zayed (2008) noticed that married academicians are less job satisfied than single one.

Table (4) highlighted that respondents aged between 25-39 and more than 50 years are more satisfied than those who are between 40-50 years old. This result is understandable since young academicians generally have few responsibilities than well-established colleagues and they are still at beginning steps of the promotion ladder. Hence, they have few problems than those who are half the way through the promotion ladder who have more responsibilities and worry about future promotions. Academicians more than 50 years old are expected to be well-established, attained the highest academic promotions and highly paid. Hence, it is not surprising to see him highly satisfied with their jobs. Noordin and Jusoff (2009) and Abushaira (2012) established significant differences in the level of job satisfaction due to age difference. Malik (2011), however, noticed that age is insignificantly related to overall job satisfaction.

The table shows respondents earn more than KD 4,500 expressed the highest level of job satisfaction; whereas, respondents earn less than KD 1,500 were the least satisfied. However, respondents who earn between KD 1,500-3,000 expressed higher level of job satisfaction than those who earn between KD 3,001- 4,500. This might be due to fact that the respondents within this category are more likely to be in the highest rank of assistance professor or they are associate professors but found it difficult to advance to the following academic rank. Respondents at the full professor level showed the highest level of satisfaction followed by associate professors. This result is in line with Mehmood *et al.* (2012) who pointed to a relationship between employees' job satisfaction and their salaries. Zayed (2008) found income as the most important determinant of academicians' job satisfaction.

When considering the relationship between academic rank and job satisfaction, table (4) revealed that respondents in the rank of full professors are the most satisfied and the assistant professors are the least satisfied. This result is comprehensible since academicians at the full professor rank have already achieved the highest advancements and they are expected to be paid more than associate and assistant professors. Although some of the associate professor might be frustrated due to slow advancement, many of the respondents would be promoted recently or they are not yet due for promotion. Furthermore, slow advancement might be compensated with other aspects of job satisfaction. What is important to notice in the table is that respondents at the lecturer level are more satisfied with their job than assistant professors. The result can be explained on the ground that lecturers are generally hold Masters degree and they do not expect any change in their academic rank unless they obtain PhDs. Hence, they are expected to be less frustrated than assistant professors who are waiting for promotion to the associate professor level. The result is in support of previous research undertaken by Oshagbemi (1996, 2003) and demonstrated that academicians' rank is a significant determinant of their level of satisfaction. This is also in support of Stevens (2005) and Toker (2011) who found professors are generally happier in their jobs than their colleagues at lower academic ranks. Yet, Malik (2011) indicated that academicians demographic characteristics such as age, years of experience, academic rank and academic qualifications are negligibly related to the overall job satisfaction.

As for the effect of the respondents work experience on the level of satisfaction, table (4) revealed that respondents with more than 10 years and between 1-5 years of work experience are the most satisfied ones. Respondents with less than 1 year and 6-10 years of work experience are the least satisfied. The result is highly associated with other variables such as monthly income and academic rank. For those who have less than 1 year of work experience they are expected to have low income and to wait for a while before achieving any promotion. Respondents who have 6-10 years of work experience are more likely to be in the rank of associate professor and waiting for promotion to full professor. Hence, they are expected to have low level of job satisfaction. This result is in line with Oshagbemi (1996,

2003) who indicated that the length of service is a significant predictor of academicians' level of satisfaction. Yet, Zayed (2008) noticed that academicians with less than five years of service are more satisfied than their counterparts who have more than five years. Similarly, lecturers who hold Masters degree will have low salary and they have limited prospect of any future advancement. Their low level of job satisfaction in comparison with respondents who hold doctorate degrees is predictable. This result is inconsistent with Ward and Sloane (2000) who reported a decline in job satisfaction with level of education.

The result of the questionnaire analysis reported in table (4) revealed that respondents who obtained their last academic degree from USA and UK and more satisfied than graduates from other countries. It is a common practice in the Gulf Universities including Kuwait to give priority to American and British Universities graduates. In addition, the higher education system in the Kuwaiti universities is influenced by the USA and UK systems of education. This gives graduates from these two countries priority in the recruitment phase and their familiarity with the education system assists them in attaining quick advancements.

Finally, table (4) illustrates the effect of waiting time since the respondents achieved their last academic promotion on the level of job satisfaction. While respondents who were waiting less than one year or between 1-3 years are the most satisfied with their job, respondents who received their last promotion more than 6 years ago or between 4-6 years ago are the least satisfied. This is an anticipated result since the more the academicians wait for their promotion the more they get frustrated and this will affect their level of job satisfaction. Needless to say, achieving promotion has income, recognition and social implications.

Table 4. Participants characteristics and the level of job satisfaction

	Nationality			University Status		Gender		Marital Status		Age		
	All	Kuwaiti	Non-Kuwaiti	State Univ.	Private Univ.	Male	Female	Single	Married	25-39	40-50	More than 50
Ability utilization: The chance to do something that makes use of my abilities	3.48	3.18	3.71	3.33	3.55	3.31	3.78	3.60	3.43	3.73	3.30	3.50
Achievement: The feeling of accomplishment I get from the job.	3.73	3.57	3.85	3.62	3.78	3.66	3.86	3.77	3.71	3.78	3.65	3.78
Activity: Being able to keep busy all the time.	3.65	3.51	3.76	3.60	3.68	3.62	3.71	3.72	3.62	3.76	3.49	3.78
Advancement: The chance for advancement on this job.	2.95	2.69	3.15	2.81	3.01	2.84	3.14	3.04	2.90	3.08	2.79	3.04
Authority: The chance to tell other people what to do.	3.23	3.08	3.35	3.12	3.28	3.18	3.33	3.43	3.14	3.14	3.11	3.48
Company policies and practices: The way university policies are put into practice.	3.19	2.89	3.43	2.81	3.35	3.08	3.39	3.43	3.07	3.32	2.96	3.37
Compensation: My pay reflects the work I do.	3.42	3.25	3.55	3.48	3.39	3.41	3.43	3.51	3.37	3.41	3.33	3.54
Co-workers: The way my co-workers get along with each other	3.28	3.05	3.45	3.05	3.37	3.19	3.43	3.49	3.17	3.27	3.18	3.41
Creativity: The chance to try my own methods of doing the job.	3.55	3.41	3.65	3.67	3.49	3.51	3.61	3.64	3.50	3.57	3.37	3.74
Independence: The chance to work alone on the job.	3.71	3.72	3.70	4.02	3.58	3.64	3.82	3.77	3.68	3.81	3.39	4.02
Moral values: Being able to do things that don't go against my conscience	3.51	3.46	3.55	3.67	3.44	3.37	3.76	3.57	3.48	3.62	3.26	3.72
Recognition: The praise I get from doing a good job.	3.16	2.74	3.48	2.79	3.31	2.96	3.51	3.45	3.01	3.35	2.96	3.22
Responsibility: The freedom to use my own judgment.	3.28	3.30	3.26	3.52	3.17	3.20	3.41	3.38	3.22	3.27	3.04	3.57
Security: The way my job provides for steady employment.	3.59	3.79	3.44	4.26	3.30	3.49	3.76	3.51	3.63	3.68	3.42	3.74
Social service: The chance to do things for other people.	3.81	3.82	3.80	3.98	3.74	3.78	3.86	3.91	3.76	4.03	3.65	3.85
Social status: The chance to be "somebody" in the community.	3.74	3.95	3.59	4.02	3.63	3.83	3.59	3.64	3.80	3.73	3.67	3.87
Supervision-human relations: The way my boss handles his/her workers.	3.32	3.07	3.51	3.02	3.44	3.17	3.59	3.43	3.27	3.70	2.91	3.52
Supervision-technical: The competence of my supervisor in making decisions.	3.16	2.93	3.34	3.05	3.21	3.04	3.37	3.45	3.02	3.27	2.89	3.41
Variety: The chance to do different things from time to time.	3.24	2.90	3.50	3.07	3.31	3.12	3.45	3.40	3.16	3.24	3.02	3.52
Working conditions	3.42	3.23	3.56	3.33	3.45	3.40	3.45	3.57	3.34	3.38	3.19	3.74
<b>Overall Score</b>	<b>68.42</b>	<b>65.52</b>	<b>70.63</b>	<b>68.21</b>	<b>68.51</b>	<b>66.80</b>	<b>71.27</b>	<b>70.70</b>	<b>67.28</b>	<b>70.14</b>	<b>64.58</b>	<b>71.83</b>

	Monthly Income				Academic Rank				Work Experience			
	Less than 1,500 KD	KD 1,500-3,000	KD 3001-4,500	More than 4,500 KD	Lecturer	Assis. Prof.	Assoc. Prof.	Full Prof.	Less than 1 year	1-5 Years	6-10 Years	More than 10 years
Ability utilization: The chance to do something that makes use of my abilities	3.35	3.47	3.49	3.61	3.51	3.44	3.21	3.94	3.50	3.59	3.47	3.43
Achievement: The feeling of accomplishment I get from the job.	3.55	3.75	3.72	3.94	3.77	3.65	3.75	3.88	3.67	3.62	3.81	3.75
Activity: Being able to keep busy all the time.	3.15	3.67	3.69	4.06	3.51	3.72	3.71	3.71	3.67	3.62	3.67	3.66
Advancement: The chance for advancement on this job.	2.45	3.14	3.00	2.94	2.77	2.86	3.25	3.29	2.33	3.15	2.69	3.05
Authority: The chance to tell other people what to do.	2.85	3.44	3.24	3.22	3.23	3.21	3.13	3.47	2.67	3.29	3.19	3.28
Company policies and practices: The way university policies are put into practice.	3.20	3.31	3.18	3.00	3.30	3.12	2.96	3.47	2.50	3.38	3.22	3.14
Compensation: My pay reflects the work I do.	2.90	3.25	3.57	3.78	3.37	3.11	3.88	3.94	2.33	3.38	3.31	3.60
Co-workers: The way my co-workers get along with each other	3.05	3.47	3.31	3.00	3.37	3.16	3.33	3.35	3.17	3.29	3.22	3.31
Creativity: The chance to try my own methods of doing the job.	3.35	3.44	3.49	4.17	3.37	3.51	3.71	3.88	3.50	3.50	3.44	3.63
Independence: The chance to work alone on the job.	3.30	3.72	3.63	4.44	3.67	3.61	3.83	3.94	3.83	3.50	3.67	3.83
Moral values: Being able to do things that don't go against my conscience	3.10	3.50	3.49	4.06	3.49	3.40	3.46	4.00	3.83	3.50	3.28	3.62
Recognition: The praise I get from doing a good job.	3.55	3.44	2.97	2.83	3.26	3.04	2.92	3.65	3.50	3.12	2.94	3.26
Responsibility: The freedom to use my own judgment.	3.25	3.36	3.07	3.89	3.33	3.19	3.33	3.35	3.83	3.26	2.81	3.49
Security: The way my job provides for steady employment.	3.35	3.39	3.49	4.61	3.53	3.54	3.67	3.76	3.83	3.50	3.33	3.75
Social service: The chance to do things for other people.	3.75	3.78	3.76	4.11	3.84	3.77	3.75	3.94	4.17	3.85	3.67	3.83
Social status: The chance to be "somebody" in the community.	3.35	3.83	3.66	4.33	3.65	3.74	3.88	3.82	3.50	3.62	3.69	3.86
Supervision-human relations: The way my boss handles his/her workers.	3.80	3.61	3.12	2.94	3.56	3.07	3.33	3.53	3.00	3.38	3.25	3.35
Supervision-technical: The competence of my supervisor in making decisions.	3.30	3.42	3.00	3.11	3.26	2.98	3.29	3.35	3.00	3.06	2.97	3.34
Variety: The chance to do different things from time to time.	3.15	3.31	3.15	3.56	3.16	3.11	3.46	3.59	2.17	3.15	3.17	3.43
Working conditions	3.00	3.83	3.28	3.56	3.47	3.19	3.71	3.65	2.67	3.41	3.17	3.63
<b>Overall Score</b>	<b>64.75</b>	<b>70.14</b>	<b>67.31</b>	<b>73.17</b>	<b>68.42</b>	<b>66.42</b>	<b>69.54</b>	<b>73.53</b>	<b>64.67</b>	<b>68.18</b>	<b>65.97</b>	<b>70.25</b>

	Academic Degree		Place where last academic degree obtained					Years since last academic qualification				
	Masters	PhD.	Arab Country	USA	UK	Canada	European non-UK	Less than 1	1-3 years	4-6 years	More than 6 years	
Ability utilization: The chance to do something that makes use of my abilities	3.40	3.54	3.30	3 1/2	3.50	3.25	3.45	3.45	3.60	3.71	3.30	
Achievement: The feeling of accomplishment I get from the job.	3.70	3.75	3.52	3 3/4	3.71	3.38	3.91	3.75	3.81	3.79	3.60	
Activity: Being able to keep busy all	3.40	3.79	3.30	3	3.91	3.00	3.00	3.85	3.60	3.71	3.58	

the time.				3/4							
Advancement: The chance for advancement on this job.	2.70	3.08	2.65	3	3.18	3.25	2.36	2.55	3.19	3.00	2.96
Authority: The chance to tell other people what to do.	3.09	3.32	2.96	3 1/3	3.50	2.88	2.64	2.85	3.24	3.42	3.34
Company policies and practices: The way university policies are put into practice.	3.23	3.18	3.00	3 1/4	3.29	3.25	2.73	2.85	3.31	3.63	3.04
Compensation: My pay reflects the work I do.	3.23	3.52	3.04	3 3/5	3.35	3.38	3.09	3.00	3.40	3.54	3.56
Co-workers: The way my co-workers get along with each other	3.17	3.3587	2.91	3 3/8	3.41	3.25	2.82	3.15	3.36	3.33	3.24
Creativity: The chance to try my own methods of doing the job.	3.23	3.7174	3.17	3 2/3	3.56	3.13	3.64	3.55	3.43	3.63	3.62
Independence: The chance to work alone on the job.	3.49	3.8478	3.35	4	3.79	3.13	3.64	3.70	3.74	3.54	3.84
Moral values: Being able to do things that don't go against my conscience	3.38	3.6087	3.13	3 2/3	3.44	3.25	3.64	3.25	3.64	3.58	3.50
Recognition: The praise I get from doing a good job.	3.26	3.1196	3.13	3	3.18	3.38	3.36	2.90	3.55	3.50	2.84
Responsibility: The freedom to use my own judgment.	3.17	3.3370	3.13	3 1/3	3.38	2.63	3.00	3.00	3.40	3.29	3.30
Security: The way my job provides for steady employment.	3.60	3.5761	3.39	3 6/7	3.41	3.38	3.00	3.25	3.60	3.71	3.70
Social service: The chance to do things for other people.	3.70	3.8478	3.70	3 5/6	3.82	3.75	3.91	4.10	3.86	3.83	3.64
Social status: The chance to be "somebody" in the community.	3.51	3.8696	3.52	3 5/6	3.94	3.00	3.64	4.05	3.62	3.46	3.84
Supervision-human relations: The way my boss handles his/her workers.	3.43	3.2935	3.22	3 1/3	3.41	3.13	3.00	3.20	3.74	3.38	3.04
Supervision-technical: The competence of my supervisor in making decisions.	3.15	3.1848	3.04	3 1/6	3.15	3.38	2.73	2.90	3.45	3.08	3.04
Variety: The chance to do different things from time to time.	3.15	3.3043	2.96	3 1/3	3.12	3.38	3.27	3.15	3.38	3.08	3.24
Working conditions	3.30	3.4891	3.13	3 4/9	3.56	3.38	3.09	3.10	3.48	3.54	3.46
<b>Overall Score</b>	<b>66.30</b>	<b>69.74</b>	<b>63.57</b>	<b>70</b>	<b>69.62</b>	<b>64.50</b>	<b>63.91</b>	<b>65.60</b>	<b>70.38</b>	<b>69.75</b>	<b>67.68</b>

Although descriptive statistic highlighted differences in the effect of respondents' characteristics on the level of their job satisfaction, it was important to identify which of these characteristics are statistically significant. To do so, forward regression analysis was performed and the result is reported in table (5). It is evident from the table that respondents' academic qualification was the least significant variable in determining the level of job satisfaction followed by work experience and academic rank. The status of the university whether public or private, the place where the last academic qualification was obtained, marital status and the age of the respondents appeared to be marginally significant determinants of job satisfaction. Yet, respondents' income, nationality and gender were statistically significant determinants of job satisfaction of academicians who work for business colleges in Kuwait.

#### 4. Conclusion

The objective of this study is to identify the level of job satisfaction of academicians who work for business colleges in Kuwait. Kuwait currently has eight universities that offer business academic degrees. Some of these colleges offer two years Diploma, others offer Bachelor Degree and few MBA or MSc. To achieve the objective of the study, a commonly used short-form Minnesota Satisfaction Questionnaire (MSQ) to measure academicians job satisfaction was used. During the period between December 2016 and March 2017, 30 copies of the translated version of the questionnaire were distributed to academicians working in each of the eight Kuwaiti business colleges. 141 questionnaires returned completed, resulting in %59 usable response rate. The result of the questionnaire analyses revealed that the respondents represent both Kuwaiti and non-Kuwaiti nationals. Some of them work for governmental business colleges and others work for private colleges. The respondents hold either Masters or PhD academic qualification. They obtained their last academic degrees from different countries, although graduates from USA and UK universities formed the majority. The respondents further occupying different academic ranks, representing both genders and vary in the years of work experience and income. Variations in the respondents' characteristics provide good grounds for comparison and credibility to the outcome of the study. The overall level of job satisfaction was relatively high (68.42%). The respondents appeared to be highly satisfied with the social service and social status, independence, achievement and activity aspects of their jobs. They expressed moderate satisfaction with compensation, supervision, co-workers, authority and variety. The respondents, however, were less satisfied with the advancement, recognition, college policies and practices, supervision-technical, authority and variety aspect of job satisfaction. Although different characteristics of the respondents showed that they impact the level of their satisfaction as reflected by the resulted

different means, regression analysis only pointed to three characteristics (income, nationality and gender) as statistically significant determinants job satisfaction of academicians work for business colleges in Kuwait.

Table (5). Backward Regression

Model	F	Sig.	Adj. R <sup>2</sup>	$\beta_0$	NAT	UNIV	GEN	MARS	ACCR	WORE	LANQ	AGE	PLAQ	INCO
1	.043	1.625	.106	-0.44	0.21	-0.15	0.16	0.05	-0.01	0.00	0.01	0.07	-0.01	0.13
				-1.097	1.848	-1.106	1.685	0.476	-0.121	0.066	0.053	1.014	-0.162	1.967
				(0.275)	(0.067)	(0.271)	(0.094)	(0.635)	(0.904)	(0.947)	(0.958)	(0.312)	(0.872)	(0.051)
2	.050	1.819	.070	-0.44	0.21	-0.15	0.16	0.05	-0.01	0.00		0.07	-0.01	0.14
				-1.10	1.86	-1.11	1.70	0.49	-0.11	0.06		1.04	-0.15	2.21
				(0.27)	(0.07)	(0.27)	(0.09)	(0.62)	(0.91)	(0.95)		(0.30)	(0.88)	(0.03)
3	.057	2.062	.044	-0.44	0.21	-0.15	0.16	0.05	0.00			0.07	-0.01	0.14
				-1.11	1.87	-1.13	1.71	0.49	-0.10			1.26	-0.15	2.22
				(0.27)	(0.06)	(0.26)	(0.09)	(0.62)	(0.92)			(0.21)	(0.88)	(0.03)
4	.064	2.373	.026	-0.43	0.21	-0.15	0.16	0.05				0.07	0.00	0.13
				-1.11	1.90	-1.13	1.71	0.49				1.29	-0.15	2.27
				(0.27)	(0.06)	(0.26)	(0.09)	(0.63)				(0.20)	(0.89)	(0.03)
5	.071	2.785	.014	-0.44	0.20	-0.15	0.16	0.05				0.07		0.13
				-1.16	1.91	-1.12	1.73	0.47				1.29		2.28
				(0.25)	(0.06)	(0.26)	(0.09)	(0.64)				(0.20)		(0.02)
6	.076	3.316	.007	-0.43	0.21	-0.14	0.18					0.07		0.14
				-1.15	1.97	-1.06	1.94					1.33		2.31
				(0.25)	(0.05)	(0.29)	(0.06)					(0.19)		(0.02)
7	.076	3.863	.005	-0.66	0.15		0.18					0.08		0.16
				-2.11	1.66		1.94					1.41		3.10
				(0.04)	(0.10)		(0.05)					(0.16)		(0.00)
8	.069	4.452	.005	-0.43	0.16		0.14							0.18
				-1.60	1.74		1.63							3.48
				(0.11)	(0.08)		(0.11)							(0.00)
9	.058	5.293	.006	-0.20	0.17									0.16
				-0.89	1.88									3.18
				(0.38)	(0.06)									(0.00)

### Acknowledgement

The authors wish to thank the **Kuwait Foundation** for the Advancement of Science (KFAS) for their financial support (project: P115-17IM-04).

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# An Analysis of Kuwait Economy 1995-2015

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Received: September 26, 2017

Accepted: October 11, 2017

Online Published: November 28, 2017

doi:10.5539/ass.v13n12p24

URL: <https://doi.org/10.5539/ass.v13n12p24>

## Abstract

The main objective of the paper is to examine the performance of the Kuwait economy internally and externally for the period, 1995-2015. The paper is presented in five sections. In the first section, a short profile of Kuwait is given in terms of its historical and demographic characteristics. A concise Review of Literature is given in Section 2. The third section is devoted to the macro and micro variables performance for the Kuwait economy. International trade is the focus for the fourth section with emphasis on export and import growth and index of openness. In trying to assess the external trade of the Kuwait economy, an attempt is made to present and analyze the Revealed Comparative Advantage for selected years and selected commodities. The choice of the years and commodities is dictated by availability of data.

## 1. Profile of Kuwait

In this section a brief profile of Kuwait is given in terms of its economic, political and demographic aspects.



Figure 1.

Kuwait is located in the Middle East, bordering the Persian Gulf, between Iraq and Saudi Arabia. It is strategically located at the head of the Persian Gulf. It has a total area of 17,818 sq.km and ranks 158 in the world. It is dry desert with intensely hot summers and short cool winters.

Kuwait economy is geographically small but wealthy. It is a relatively open economy with crude oil reserves of about 102 billion barrels, which is more than 6 % of world reserves. It is ranked 61 in terms of GDP (Purchasing Power Parity) with an estimate of \$165.8 billion in 2013. The real GDP growth rate is 2.3% and GDP per capita is \$42,100 and ranks 24th in the world. It is interesting to note that it ranks second in the world with respect to Gross National Savings. By saving annually 10% of government revenue in the Fund for Future Generations, the government has cushioned itself against the impact of lower oil prices. Because of uncertain political situation and poor business climate, the Kuwait economy was not able to progress as fast as it could. It was difficult to attract more investment or boost the private sector participation in the economy. (World Fact Book 2017)

Household Consumption and Government consumption are 23.9% and 16.4 % of GDP respectively. Investment in Fixed capital is 16.2% whereas there is no investment in inventories. Kuwait has a balance of trade Surplus as Exports of Goods and Services are greater than imports of Goods and Services. Exports are \$112 billion and Imports are \$24.42 billion. The export commodities are oil and refined products and fertilizers and the export partners are South Korea (16.1%), India (15.7 %); USA (11.7%); China (9.2%); and Singapore (4.2%). Import Commodities are food,

construction materials, vehicles and parts and clothing and the import partners are USA (11.8%); China (9.2%); Saudi Arabia (8.6%); Japan (8.2%); South Korea (6.9%), Germany (5.1%); India (4.6%) and UAE (4.4%). Industry and Services contribute 50.6% and 49.1% respectively to GDP whereas Agriculture is only .3 %. Labor Force is 2.38 million and about 60% are non-Kuwaiti. It ranks 27<sup>th</sup> in the world with respect to unemployment rate which is 3.4%. It ranks first with respect to Budget Surplus (29.2 %) of GDP. Revenues are \$114.1 billion and Expenditures are \$61.81 billion.

In Kuwait, the government spending is driving sector growth, diversified segments are seeing successes, environmental regulations are being implemented and the petrochemical segment is getting a boost. Kuwait provides a stable economic environment and one of the largest markets in the gulf. In spite of the softening of oil prices in the wake of the global economic crisis, the petrochemicals industry in Kuwait continued to prosper. Profits were high in 2009.

The Kuwait Government through its petrochemicals arms, Petrochemicals Industries Company (PIC) has entered into successful joint ventures with foreign partners that have brought technology, marketing and operational expertise into the country. The government has also promoted privatization of the sector through the two investment vehicles Boubyan Petrochemicals and Qurain Petrochemicals Industries Company (QPIC). The three players, PIC, foreign partners and private sector form a dynamic combination that could lead to increased competitiveness and profitability and joint ventures that are more successful in the future.

Kuwait has several advantages as manufacturing and trading base. It is conveniently located at the mouth of the gulf which gives it easy and quick access to Iraq, Iran fellow GCC nations and locations farther in field-nations in Central Asia and the Indian subcontinent. In 2009/10, the major advantage was its very strong fiscal position with a budget surplus of some \$17 bn. The Government has emphasized on environmental regulation and as a result, many industrial firms are working hard to meet health and safety standards.

## 2. Review of Literature

Most of the information reviewed in this section is the reports by different organizations. The academic literature on Kuwait economy is scanty and none was available for the period under study. In this article, “Bypassed by Dubai, Kuwait fails to keep up with its neighbours”, it is stated that Kuwaitis often compare their country with the other states of the Gulf. Kuwait has the highest GDP per person in the region and the fourth highest in the world. This is due to their large oil reserves and small population. However, in recent years it has fallen behind countries like Qatar, United Arab Emirates (UAE). Kuwait has one distinguishing characteristic, and that is: it is the closest to a democracy in the Gulf.

According to the report in the Economist, political tensions will remain high and another set of elections may take place in 2017-2018. The prediction is that the fiscal position will remain in deficit in 2017-18-21, given the dependence on oil revenue. The optimistic note in the report is that real GDP will rise from .6% in 2017, with OPEC-agreed oil output cuts weighing on growth, to an average of 3.2% in 2018-21 as sentiment gradually improves.

In The IMF Report, it is stated that:

*“Growth was resilient in 2015 as rising output in the non-oil sector more than offset a contraction in the oil sector. Financial buffers remain large, but fiscal flow positions have sharply deteriorated, prompting fuel subsidy reform. Major infrastructure projects should continue to support growth in the near to medium term. Key challenges include the need to anchor fiscal sustainability, improve natural resource wealth management and economic diversification. Poverty is not an issue for Kuwaiti citizens.”*

The Kuwait Staff Concluding Statement of the 2016 Article IV Mission states that “Kuwait’s fiscal and external accounts have been adversely affected by the lower oil prices, and financing needs have emerged. Resilient nonoil activity and strong oversight by the Central Bank of Kuwait have kept the financial sector sound. The key challenge for policymakers is to implement the government’s comprehensive six-pillar reform plan, which aims at promoting fiscal consolidation and boosting private sector growth, diversification, and job creation for nationals. Notwithstanding large buffers that provide policy space to smooth the necessary adjustment, policymakers have initiated important fiscal reforms. These should be sustained to gradually raise fiscal savings, focusing on further rationalizing energy subsidies, containing the wage bill and increasing nonoil revenue, which will create space for higher growth-enhancing capital outlays. Better aligning labor market incentives, promoting higher productivity through privatization and partnerships with the private sector, and further efforts to improve the business climate are key to encourage diversification, private sector development and employment opportunities for nationals. The Staff commented on the recent Macro-Financial Developments stating that:

- Economic Activity in the non-oil sector has continued to expand at a lower space reflecting the impact of lower prices.
- The financial sector has remained sound and credit conditions are favorable, however the fiscal and external accounts have deteriorated markedly.
- The government also has started borrowing as financial needs have been met so far by drawing down financial buffers

The Central Bank of Kuwait has highlighted some economic facts for Kuwait in its 2015 economic report. The report shows that Gross Domestic Product (GDP) amounted to 40 billion dinars (\$132 billion) which depicts a growth of 1.8%

compared to 2014. However, the report point out that Kuwait faces challenges of declining oil prices, the need to address the situation of various sectors and the importance of stimulating the various core activities in the oil and non-oil sectors.

Considering the scarcity of literature on this particular topic for this period, it was thought imperative to do a detailed analysis of Kuwait economy.

### 3. Performance of Macro Variables in Kuwait Economy

In this section, an attempt is made to examine the growth and performance of certain selected macro variables for the Kuwait economy. The variables selected are Gross Domestic Product, Population, GDP, Unemployment, inflation, FDI inflow and Public Debt.

Kuwait economy has by an estimated 3 % in 2016 supported by higher oil production and implementation of the Development plan.

The Table below gives some of the forecasts by World Bank.

Table 1. Kuwait / Macro outlook indicators (annual percent change unless indicated otherwise)

	2014	2015	2016 f	2017 f	2018 f	2019 f
<b>Real GDP growth, at constant market prices</b>	0.5	1.8	3.0	2.5	2.6	3.2
Private Consumption	4.9	2.4	4.0	4.0	2.9	2.9
Government Consumption	-0.8	-0.5	-14.5	4.8	2.9	1.9
Gross Fixed Capital Investment	4.6	13.0	10.4	6.3	4.0	5.0
Exports, Goods and Services	1.4	1.0	4.8	1.0	2.7	3.4
Imports, Goods and Services	8.0	5.1	3.5	4.3	4.1	4.1
<b>Real GDP growth, at constant factor prices</b>	1.0	-0.3	3.0	2.5	2.6	3.0
Agriculture	7.5	4.2	2.0	2.0	2.0	2.0
Industry	-0.5	-1.7	2.4	1.8	1.7	2.4
Services	3.3	1.9	3.8	3.4	4.0	3.9
<b>Inflation (Consumer Price Index)</b>	2.9	3.3	3.2	3.5	3.0	3.0
<b>Current Account Balance (% of GDP)</b>	33.2	7.5	1.9	5.0	5.5	6.1
<b>Financial and Capital Account (% of GDP)</b>	-36.8	-11.2	-5.7	-8.6	-9.1	-9.8
Net Foreign Direct Investment (% of GDP)	-8.4	-8.4	-5.0	-3.0	-2.0	-2.0
<b>Fiscal Balance (% of GDP)<sup>a</sup></b>	18.0	-0.4	0.5	4.6	4.8	4.7
Ex. inv. Income and after transfers to SWF	4.6	-17.6	-17.1	-11.9	-10.6	-11.1
<b>Debt (% of GDP)</b>	16.3	7.2	11.8	17.2	20.0	20.0
<b>Primary Balance (% of GDP)</b>	18.1	0.0	0.6	4.7	5.1	5.0

Sources: World Bank, Macroeconomics, and Fiscal management Global practice. Note: f = forecast

<sup>a</sup> Fiscal balance data is reported on a general government t basis i.e. before transfers to the sovereign wealth fund and including investment income

The above table gives the forecasts for selected macro variables in the Kuwait economy. The GDP growth is expected to increase consistently over this period for Real GDP growth at constant market prices and at constant factor prices. Private consumption (maximum value 4.9 in 2014); Government consumption ( maximum value 4.8 in 2017)); Gross Fixed capital investment ( maximum value 13.0 in 2015); Exports ,Goods and services ( maximum value 4.8 in 2016); Imports, Goods and services ( maximum value 8.0 n 2014); Industry growth rate ( maximum 2.4 in 2016 and 2019); Services ( maximum value in 4.0 in 2018) ;Inflation ( maximum value in 3.5 in 2017); Current Account Balance ( maximum 33.2 in 2014; Fiscal Balance ( maximum value in 2014) ; Debt ( maximum value in 2018 and 2019) and Primary Balance ( maximum value in 18.1 in 2014). For all these variables, the other years exhibited fluctuations. Financial and Capital Account and Net Foreign Direct investment manifested negative values for the annual percentage changes.

Detailed graphs are given for the selected economic variables for the Kuwait economy for the periods 2002-2008 and 2009-2015. The actual data is attached is given in the appendix.

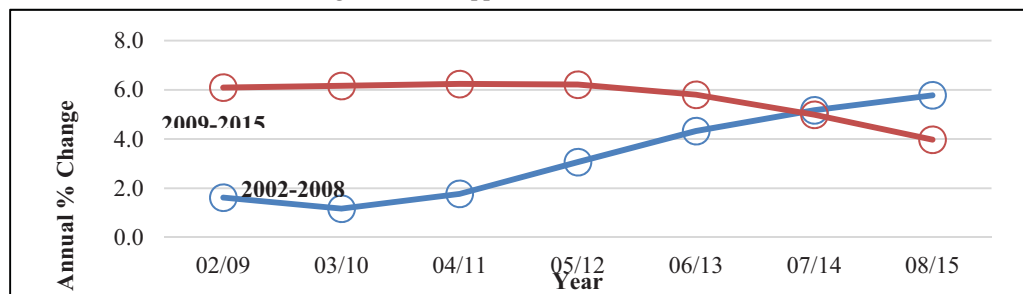


Figure 1. Annual % Change in Kuwait's Population, 2002-2015

From the above Figure 1, it is observed that whereas the population change has been increasing from 2002- 2008 there

is a decline in the period from 2009- 2015.

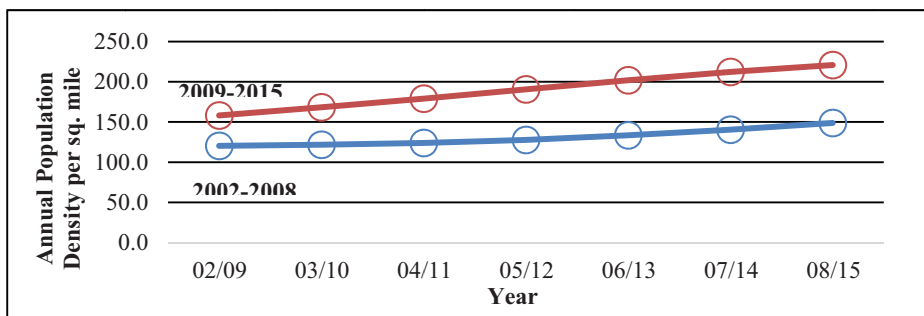


Figure 2. Population Density, Persons per Square Mile, Kuwait, 2002-2015

The density as observed from the above Figure 2 is seen to consistently increase for both periods 2002-2008 and 2009-2015 with density being much higher in the latter period.

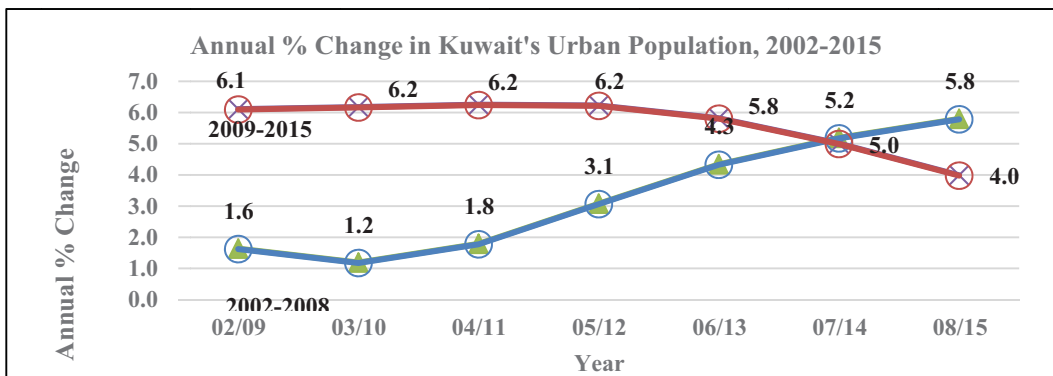


Figure 3. Annual % Change in Kuwait's Urban Population, 2002-2015

The annual % change in Kuwait's Urban Population has depicted increase in the period 2003-2008 and decline from 2009- 2015 as observed in Figure 3.

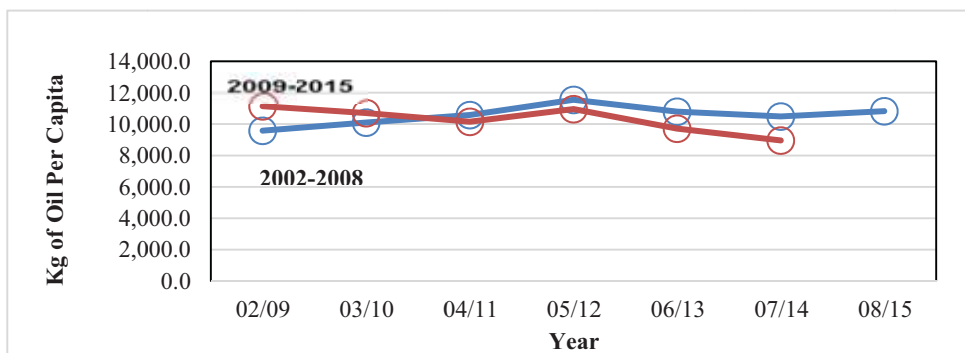


Figure 4. Energy Use, Kg of Oil Per Capita, Kuwait, 2002-2015

As the above Figure 4 reveals the energy, use has followed the same pattern in both the periods 2002-2008 and 2009-2015.

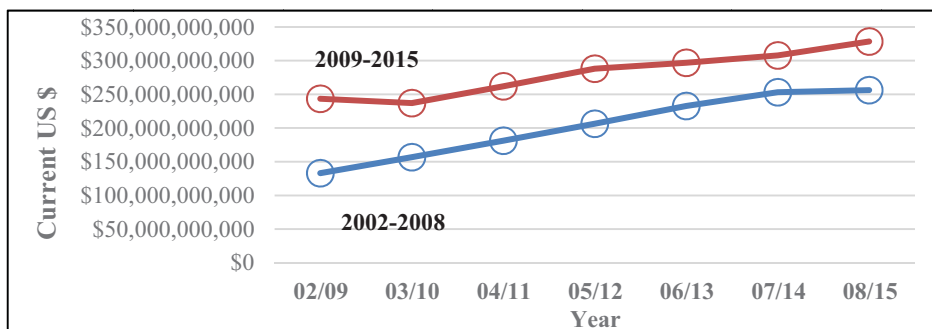


Figure 5. GNI, Purchasing Power Parity, Kuwait, 2002-2015

GNI, Purchasing Parity as seen from the Figure 5 above depicts consistent increases for both periods 2002-2008 and 2009-2015.

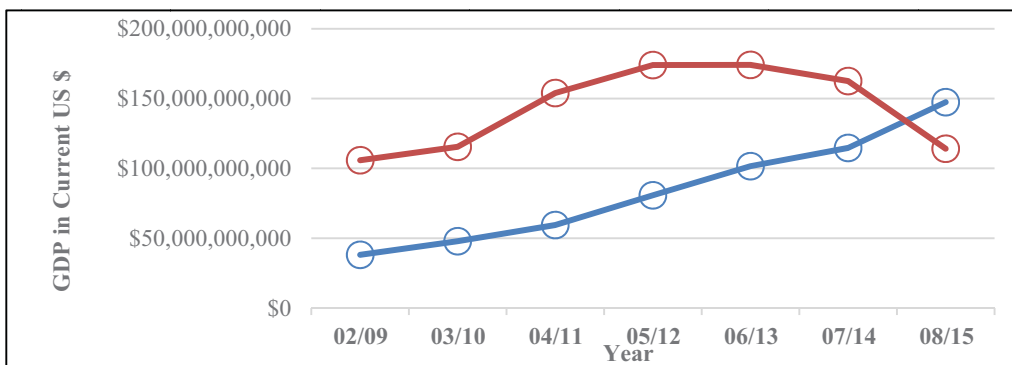


Figure 6. Gross Domestic Product, Kuwait, 2002-2015

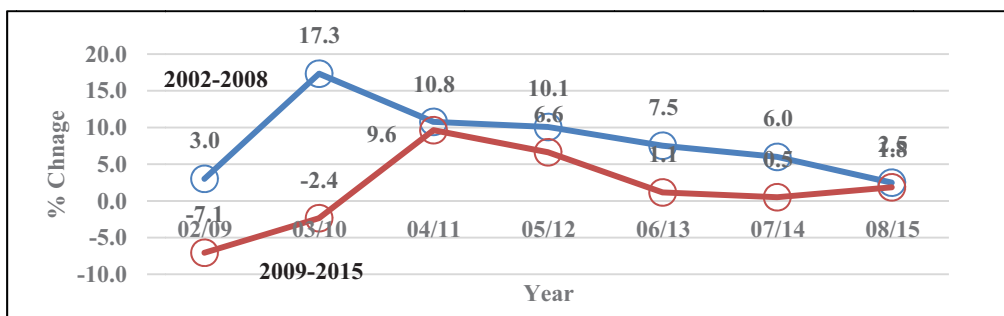


Figure 7. Annual % Change in GDP, Kuwait, 2002-2015

Figure 6 reveals that GDP has consistently increased over the period 2002-2008 but has taken a dip after 2013. The low oil prices seem to have an impact for this period.

As can be seen from the above Figure 7 the Annual % change in GDP has gone through violent fluctuations for the period 2002-2015. This may be due to the instability in oil prices.

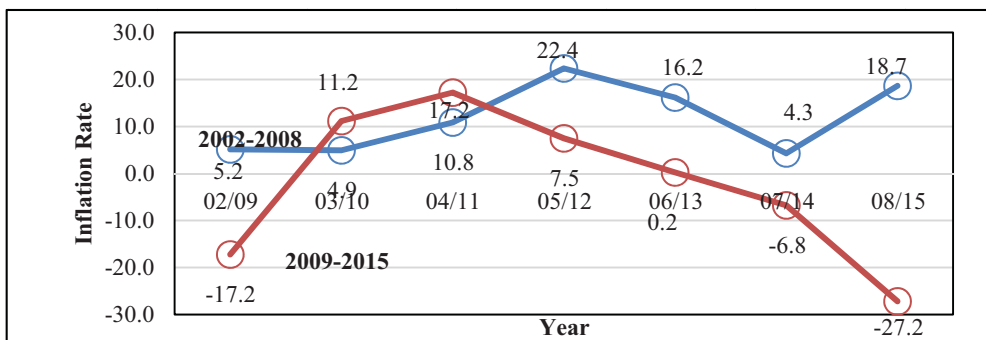


Figure 8. Inflation Rate, Kuwait, 2002-2015

The inflation rate is presented in the above Figure 8. Fluctuations are seen for the period 2002-2008 and negative values are observed for the period 2009 and 2015.

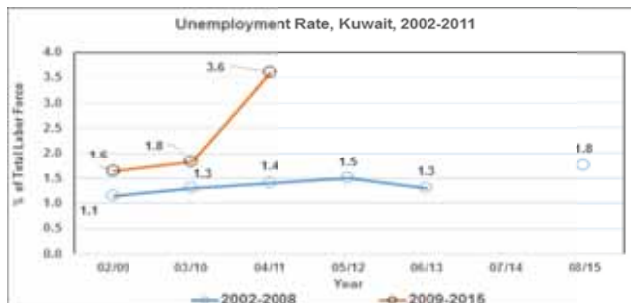


Figure 9. Unemployment Rate, Kuwait, 2002-2015

From Figure 9, it is observed that Unemployment rate increased over the study period.

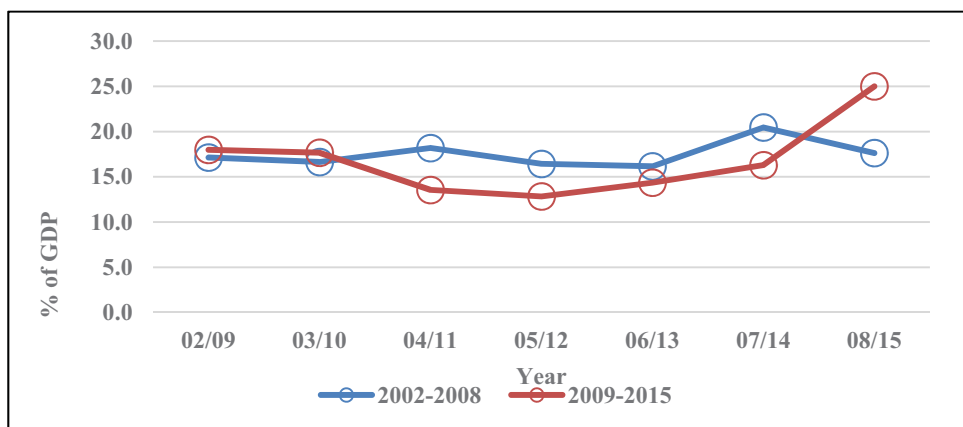


Figure 10. Gross Capital Formation as a % of GDP, Kuwait, 2002-2015

The above Figure 10 shows that Gross capital formation as a % of GDP is similar in both periods with slight variation.

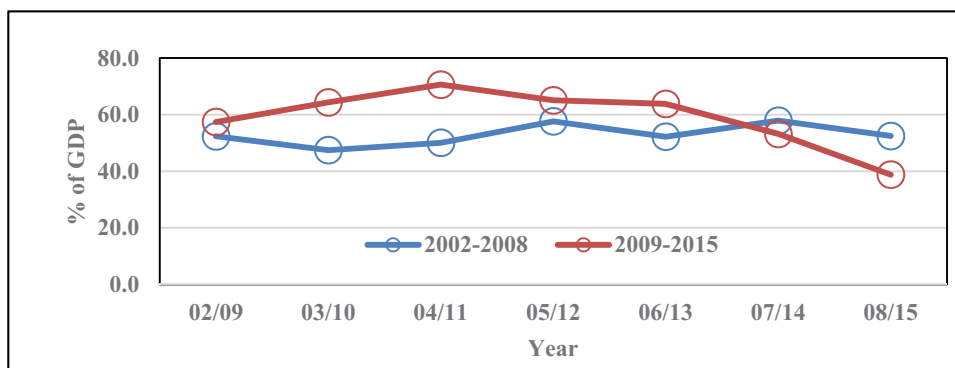


Figure 11. Revenue as a % of GDP, Kuwait, 2002-2015

Figure 11 shows that Revenue as a percentage of GDP was higher initially for the period 2009-2013 and then took a plunge after that and was lower than for the period 2002-2008

All the above graphs reveal the performance of the various economic variables in the Kuwait economy.

**4. Performance of Trade in Kuwait Economy**

This section is discussed in two parts. In the first part the performance of exports and imports, and index of openness are presented and in the second part, the estimates for Reveled Comparative Advantage commodities and for specific years are given. The choice of the period and commodities is dictated by availability of data.

*4.1 Trade performance*

**Index of Openness**

The Index of Openness indicator is defined as follows (at current prices, current exchange rates):

$$\frac{\text{Imports} + \text{exports (both goods and services)}}{\text{GDP}}$$

Goods consist of merchandise imports and exports. Services cover transport, travel, communications, construction, IT, financial, other business, personal and government services, as well as royalties and license fees.

The trade to GDP ratio is the sum of exports and imports divided by GDP. This indicator measures the ‘openness’ or ‘integration’ in the world economy. It is the combined weight of total trade in its economy, and is a measure of the degree of dependence of domestic producers on foreign markets and their trade orientation (for exports) and the degree of reliance of domestic demand on foreign supply of goods and services (imports).

Trade (both imports and exports) is vital to any successful modern economy. It is crucial for the competitiveness of the Kuwait economy in the long run. It is said that by exposing firms and products to international competition, economies are encouraged to focus on areas of comparative advantage. This helps to ensure that scarce skills and resources are deployed where they are most productive. Further trade increases, among other things, competition, enables firms to capitalize on economies of scale by having access to larger markets and encourages the spread of skills, knowledge and innovation. The index of openness indicator will be influenced not only by the trade policies adopted by Kuwait and the result of multilateral trade negotiations but also, by the state of the world economy in the macro sense.



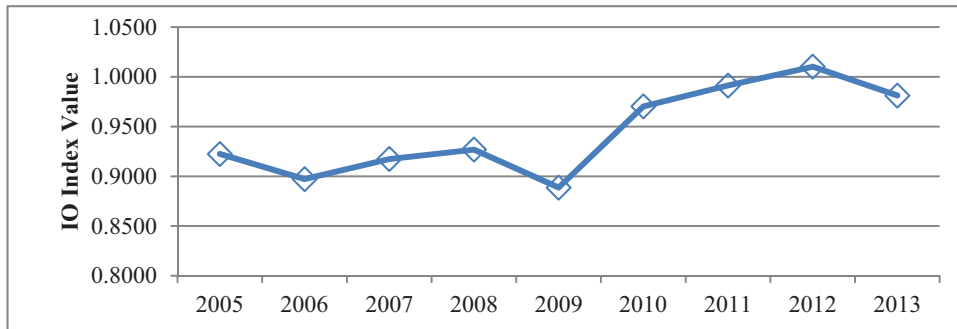


Figure 12. Kuwaiti Index of Openness, 2005 to 2013

From the Figure 12 it is observed that the index was at its peak in 2012. The year 2013 shows a decline. Increasing trend is observed from 2010-2012. The conclusion is that Kuwait is a very open economy.

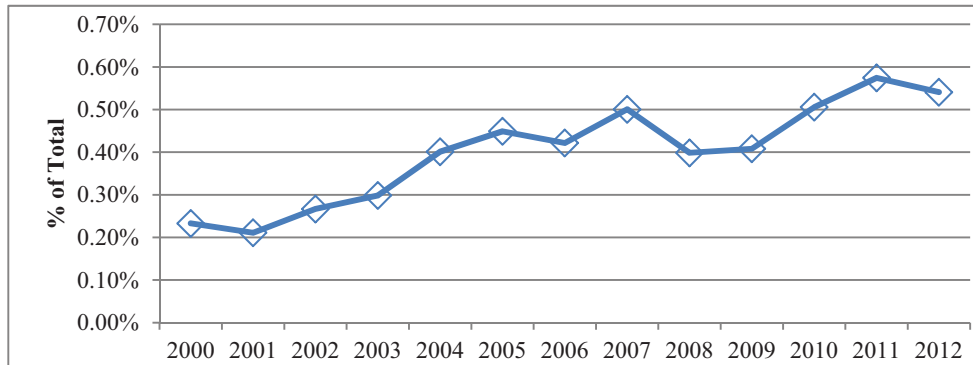


Figure 13. Total Kuwait Exports as a % of World Exports

From Figure 13, although there are slight fluctuations in Total Kuwait exports as a % of World exports the general trend is an increasing one.

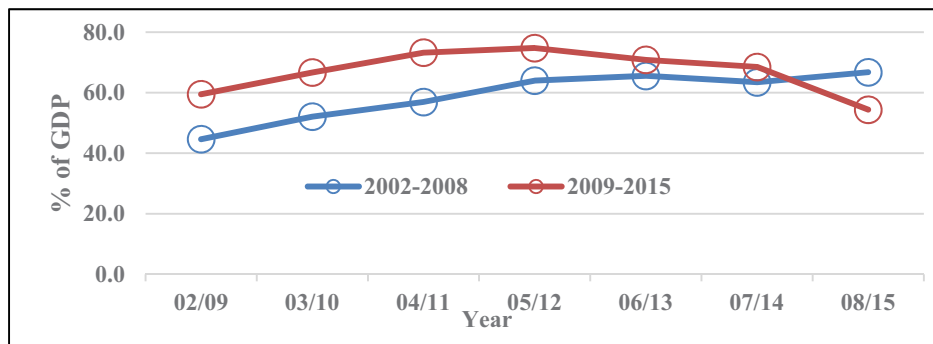


Figure 14. Exports of Goods & Services as a % of GDP, Kuwait, 2002-2015

The above Figure 14 reveals that exports of goods and services as a % of GDP are consistently higher increasing from 2002 2014 and then declined.

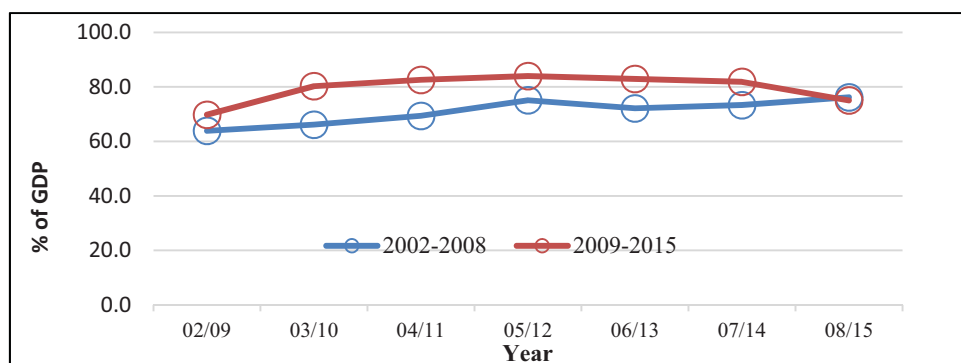


Figure 15. Merchandise Trade as a % of GDP, Kuwait, 2002-2015

Merchandise Trade as a % of GDP is given in Figure 15 and this reveals that there is a consistent increase from 2002-2015 although a decline is observed in the last year 2015.

**Revealed Comparative Advantage**

The Revealed Comparative Advantage (RCA) is a trade analysis tool to measure and assess the competitive advantage of the product which the business people need to export. The RCA indicates whether a country's product is in the process of extending the products in which it has a trade potential or simply competitive advantage.

The Revealed Comparative Advantage (RCA) is defined as a country's sectoral share divided by the world sectoral share. The values of an RCA indicate the country's competitiveness vis-a-vis the world. It also helps to assess a country's export potential.

Revealed Comparative Advantage is used to capture the degree of trade specialization of a country. If the index is higher than one, it implies that its exports of those products are more than expected on the basis of its importance in total exports of the world.

$$RCA_{ij} = ( X_{ij}/X_i ) / ( X_{aj}/X_a )$$

RCA index of Revealed Comparative Advantage

X<sub>ij</sub>= exports of product j from country i

X<sub>i</sub>= total exports from country i

X<sub>aj</sub> = total exports of product j from the world

X<sub>a</sub>= total exports of the world.

The numerator is the share of good i in the exports of country s, while the denominator is the share of good i in the exports of the world.

Possible Interpretations of RCA values:

- A value of less than unity implied that the country has a revealed comparative disadvantage in the product. However for a company to take a decision on the basis of the RCA values, a small value of RCA could also mean lesser domestic players from the country in question exporting that particular product and could mean an opportunity for the start-up SME firms. A RCA value is greater than 1 for a certain product signifies that the country has exported that commodity more intensively than the rest of the world in that year and generally this is taken as a proxy measure of a country's competitiveness. On the other word, it indicated that if the index exceeds unity, the country is said to have a revealed comparative advantage in the product.
- A fluctuating values of RCA across the years could mean a strict government policy interventions/control or else a fluctuating demand in the certain influential traditional markets for that product.
- A sudden rise in the RCA value could be due to possibility of innovation in terms of product or process or design etc. It could also be an indication of a recent announced export subsidy or incentive on that product giving a sudden flip to the product export.

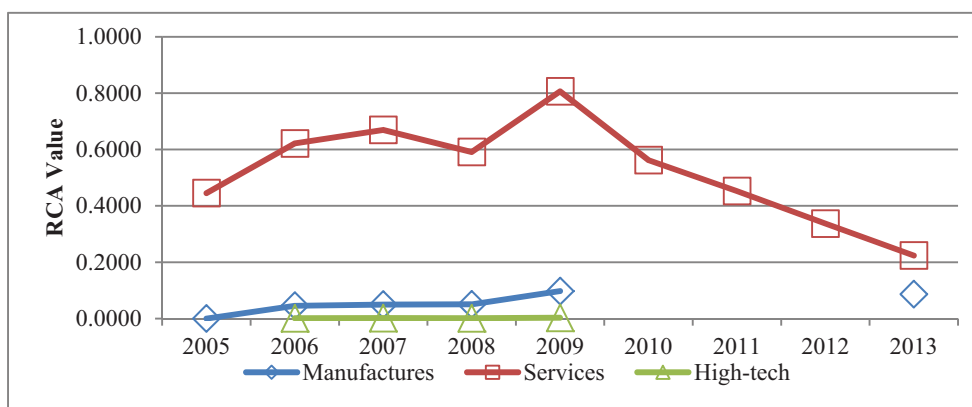


Figure 16. Revealed Comparative Advantage for Select Kuwaiti Exports

Figure 17. RCA Values for Select Kuwait Exports

Year	Manufactures Exports	Services Exports	High-tech Exports
2000	0.0689		0.0005
2001	0.0802		0.0006
2002	0.0849		0.0006
2003	0.0648		0.0003
2004	0.0577		0.0003

2005		0.4452	
2006	0.0453	0.6217	0.0007
2007	0.0494	0.6695	0.0013
2008	0.0502	0.5911	0.0009
2009	0.0975	0.8064	0.0026
2010		0.5622	
2011		0.4526	
2012		0.3371	
2013	0.0862	0.2238	
2014		0.2573	

Source: UN Comtrade, Database, 2015.

Both Manufactures and High tech yielded low values for RCA whereas the Services depicted an increasing trend from 2005-2009 and then declined from 2009 to 2014.

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### Appendices

Figure 1 and 2. Population, Kuwait, 2002-2015

Year	Population	Population density (people per sq. km of land area)
2002	2,143,833	120.3
2003	2,169,118	121.7
2004	2,207,939	123.9
2005	2,276,623	127.8
2006	2,377,258	133.4
2007	2,503,410	140.5
2008	2,652,340	148.8
2009	2,818,939	158.2
2010	2,998,083	168.2
2011	3,191,051	179.1
2012	3,395,556	190.5
2013	3,598,385	201.9
2014	3,782,450	212.3
2015	3,935,794	220.9

Figure 3. % Growth in Urban Population, Kuwait, 2002-2015

Year	% Annual Growth
2002	1.6
2003	1.2
2004	1.8
2005	3.1
2006	4.3
2007	5.2
2008	5.8
2009	6.1
2010	6.2
2011	6.2
2012	6.2
2013	5.8
2014	5.0
2015	4.0

Figure 4,5,6 and 8. Gross Domestic Product-related Values, Kuwait, 2002-2015

Year	GDP (Current US%) 2002-2008	GDP growth (annual %)	Inflation, GDP deflator (annual %)
2002	\$38,137,545,245	3.0	5.2
2003	47,875,838,926	17.3	4.9
2004	59,440,108,585	10.8	10.8
2005	80,797,945,205	10.1	22.4
2006	101,550,654,721	7.5	16.2
2007	114,641,097,818	6.0	4.3
2008	147,395,833,333	2.5	18.7
2009	105,899,930,507	-7.1	-17.2
2010	115,419,050,942	-2.4	11.2
2011	154,027,536,232	9.6	17.2
2012	174,070,025,009	6.6	7.5
2013	174,161,495,063	1.1	0.2
2014	162,631,763,879	0.5	-6.8
2015	114,041,209,704	1.8	-27.2

Source: World Bank, Databank, 2017

Figure 9. Kuwait Unemployment Rate

Year	Unemployment Rate
2002	1.1
2003	1.3
2004	1.4
2005	1.5
2006	1.3
2007	NA
2008	1.8
2009	1.6
2010	1.8
2011	3.6
2012	NA
2013	NA
2014	NA
2015	NA

Data from database: World Development Indicators

## Gross National Income, Kuwait, 2002-2015

	GNI, Atlas method (current US\$)	GNI per capita, Atlas method (current US\$)	GNI, PPP (current international \$)	GNI per capita, PPP (current international \$)
2002	\$40,499,264,957	\$18,890	\$133,126,442,714	\$62,100
2003	48,845,783,299	22,520	156,820,224,628	72,300
2004	62,035,746,832	28,100	181,317,779,004	82,120
2005	78,321,130,397	34,400	206,311,597,103	90,620
2006	98,291,913,826	41,350	232,650,743,842	97,870
2007	119,141,104,847	47,590	253,188,698,631	101,140
2008	137,351,808,666	51,790	256,141,861,929	96,570
2009	129,674,446,849	46,000	243,335,477,724	86,320
2010	126,114,335,697	42,060	237,103,277,875	79,080
2011	138,843,572,852	43,510	261,909,682,318	82,080
2012	169,624,637,549	49,950	287,989,538,164	84,810
2013	187,083,429,406	51,990	296,875,600,878	82,500
2014	187,315,487,092	49,520	307,820,169,631	81,380
2015	164,040,880,973	41,680	328,320,751,288	83,420

Figure 10 and 11 - Selected Kuwait Economic Characteristics - Investment &amp; Revenue

Series Name	2002	2003	2004	2005	2006	2007	2008
Gross capital formation (% of GDP)	17.1	16.6	18.2	16.4	16.2	20.5	17.6
Revenue, excluding grants (% of GDP)	52.4	47.5	50.1	57.6	52.2	57.9	52.5
Domestic credit provided by fin. sector (% of GDP)	81.8	76.7	65.1	55.3	59.9	69.8	66.2
Tax revenue (% of GDP)	1.2	1.3	1.3	1.0	1.0	1.1	0.9
Table 4B	2009	2010	2011	2012	2013	2014	2015
Gross capital formation (% of GDP)	18.0	17.7	13.5	12.8	14.4	16.3	25.0
Revenue, excluding grants (% of GDP)	57.4	64.3	70.6	65.1	63.8	53.2	38.8
Domestic credit provided by fin. sector (% of GDP)	90.5	75.3	59.4	51.4	54.3	61.1	87.4
Tax revenue (% of GDP)	1.0	1.0	0.8	0.7	0.8	0.9	1.4

Figure 12. Calculation of Index of Openness for Kuwait

Series Name	2010	2011	2012	2013
GDP (Current US\$)	\$115,416,397,090	\$154,034,941,942	\$174,044,698,001	\$175,826,716,256
Exports (Current US\$)	76,952,173,361	112,783,968,226	130,069,220,216	125,822,738,675
Imports (Current US\$)	35,034,086,271	39,894,348,460	45,739,097,955	46,676,632,247
IO = Exports + Imports/ GDP	0.9703	0.9912	1.0101	0.9811

Source: World Bank, Databank, 2017

Figure 13 and 14. Selected Kuwait Economic Characteristics - Exports &amp; FDI

Series Name	2002	2003	2004	2005	2006	2007	2008
Exports of goods and services (% of GDP)	44.6	52.1	56.9	64.0	65.5	63.4	66.8
Imports of goods and services (% of GDP)	36.6	34.5	32.4	28.3	24.2	28.3	25.9
High-technology exports (% of mnfd exps)	0.2	0.1	0.1	--	0.3	0.5	0.3
Merchandise trade (% of GDP)	63.9	66.1	69.4	75.1	72.1	73.3	76.2
FDI, net inflows (BoP, 1,000s of curr US\$)	3,619	-67,111	23,753	233,904	121,306	111,536	-5,952
Table 3B/Year	2009	2010	2011	2012	2013	2014	2015
Exports of goods and services (% of GDP)	59.5	66.7	73.2	74.7	70.9	68.5	54.4
Imports of goods and services (% of GDP)	29.4	30.4	25.9	26.3	26.7	31.5	45.3
High-technology exports (% of mnfd exps)	0.5	3.0	2.7	--	1.4	0.1	2.7
Merchandise trade (% of GDP)	69.8	80.3	82.6	84.0	82.9	81.9	75.1
FDI, net inflows (BoP, 1000's of curr US\$)	1,113,588	1,304,068	3,259,068	2,870,589	1,433,630	485,807	284,648

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# Impact of Sago Crop Commercialization Programs on Gender Roles of Melanau Communities in Sarawak, Malaysia

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Received: August 29, 2017

Accepted: October 2, 2017

Online Published: November 28, 2017

doi:10.5539/ass.v13n12p35

URL: <https://doi.org/10.5539/ass.v13n12p35>

## Abstract

Melanau men are known for their significant roles in the cultivation of sago palm as smallholder farmers while the women take charge of processing sago-based food products. Melanau sago farmers play important roles in maintaining their rural livelihood as the ethnic minority group in the northwest coastal communities of Sarawak, Malaysia. In an attempt to contribute to the corpus of knowledge on Melanau gender roles and their unique farming practices, this paper adapts gender relations framework in order to assess the impact of sago commercialization programs that were established by the local authority since 1980s. The findings revealed that the changes of traditional gender roles among men and women are influenced by gender relations factors i.e. gender division of labour, access to or control of resources and household decision making. In addition, sago production promises a greater prospect of moving away from low to high commercial level of production only if human capital that makes sago crop difficult to commercialize are tackled in the Melanau community. This suggests that more attention to human factors is needed when authorities formulate policies relating to commercialization program.

**Keywords:** rural women, smallholder farmers, gender relations, commercialization programs, Melanau communities

## 1. Introduction

Researchers posit that in the developing countries, commercialization of indigenous agricultural commodities is regarded as a prerequisite for achieving social and economic development of rural communities (Belcher & Schreckenber, 2007; Carletto, et al., 2017). More importantly, commercialization programs directed at gender mainstreaming promote increased participation of men and women in the production, processing and marketing of agricultural commodities at local and international markets (Rubin & Manfre, 2014; Forsythe, Posthumus & Martin, 2016). The recognition that rural communities served as hub for agricultural resources and the continuous interventions of government and development agencies in revitalising rural economy not only will benefit rural households but also will lead to economic growth and development (Scott, 2014; Millstone, Thompson, & Brooks, 2009). In the context of the sago cultivation sector in Sarawak, Malaysia, men and women assist one another in sago value chain, whereby men are in charge of sago palm cultivation and maintenance because of their physical strength and tedious nature of the work involved while the women involve in food production, processing and marketing as well as assisting their men in the farm (Barton, 2012; Hirschman, 2016).

Initially sago development programs established by the government of Sarawak are designed to facilitate the sago production of the rural Melanau smallholder farmers. Concerns over the yield of sago which is inconsistent and low compared with its economic potential has led to the establishment of more agencies by the government in initiating the sago commercialization programs. In promoting the value of sago, the crop is given an image as “the 21st Century Crop” in which its potential is expected to contribute to higher export revenue for Sarawak as well as to diversify sago-based food products. In addition, sago is being promoted as the crop that is indigenous to Sarawak where the sago-based food products are promoted for tourism purposes because of the Melanau cultural identity is generally attached to sago. The downstream activities of using sago starch which involved women are for local consumption and the preservation of Melanau food cultural identity has been established in the areas of processing and marketing.

The commercialization programs require the engagement of the Melanau smallholders’ household in the farming and production of sago-based food products who are willing to transcend from low production to commercial level. This change requires the actors to adopt new ideas of farm management, farming practices and their commitment. However, these new ideas, are viewed and misunderstood by many farmers to be contradicted with the traditional farming beliefs and practices. The Melanau community had highly regarded the sago palm tree which permeates through their daily economic and socio-cultural activities. However, the unique traditional sago farming practice which is considered as their part-time job and ‘after retirement job’ poses a challenge toward maximizing production.

The objectives of this research are two folds. Firstly, it is to examine gender roles of Melanau men and women in sago production while capitalising on gender relations. Secondly, the study is to describe the processes and impact of sago

commercialization on gender roles. The research analysis on the qualitative data will form the basis for assessing the productivity of smallholder farmers and sago-based food processors capitalising on the commercialization programs initiated by the government.

## 2. Literature Review

### 2.1 Gender Roles and Commercialization

We operationalize gender roles as the daily practices perform by male and female farmers in relation to their work. Anthropologists who studied gender relations on many Southeast Asian peasant communities have established the concept of “complementarity” in describing the roles of men and women (King & Wilder, 2003, p. 263). The concept refers to a division in the roles of husband and wife in the organization of acquiring and managing the family’s economic resources. For example, complementarity roles of men and women were evident in the Malay fishing community (Firth, 1966; Carsten 1997), Malay rice cultivation community (Winzeler, 1974), and Iban rice cultivation community (Mashman, 1991). Firth (1966) contended that fishing was the primary economic activity in generating food and cash for Malay families in Kelantan where the husband fishes whilst the wife transforms the products into food and cash. Hence, the gender complementarity roles of men and women are extended here to conceptualize the rural Melanau sago smallholders’ gender roles.

In the context of production, gender relations can be viewed as a historical, cultural and socially constructed phenomenon (Whatmore, 1991). Going by these components, gender relations is not fixed but it changes over the temporality of time base on process and content. For instance, the change phase depends on how fast women respond to government initiated program. Le (2009) reported that for almost 30 decades rural Vietnam women have showed their success in permeating the traditional male occupation of woodcarving. This is an indication that in terms of production, gender relations are constantly restructured to suit the processes involved in production which is usually characterised by factors relating to the internal and external context such as household development, technological innovations, change in government policies etc. Thus, the focus of this paper is to investigate production from the point of view of internal context which is household development.

The intensification of women’s empowerment programs in agriculture promote improved food productivity and security. This development draws the attention of development organizations, policy makers and non-governmental organizations to empower women as important contributors to food production and ensure that inequality and discrimination against them is drastically reduced (World Bank, 2012). Though, gender structures are heterogeneous and multifaceted, in the sense that they are characterised by cultural norms and values which varies across various geographical locations (Mason, 2005). However, research revealed that in Southeast Asia, women benefit more through empowerment than their other counterparts in other developing countries (IFAD, 2013). They enjoyed relative liberty in terms of decision making unlike in many African countries where decisions are made for women by their husbands and other stakeholders. This fact signifies that they have a high level of control over their resources, assets and income (IFAD, 2013). Despite benefit acquired by women through commercialization program, it also disempowers them in production (Tsusaka et al., 2016). Research revealed that women are mostly side-lined in the supply of high quality agricultural products, which means that men take charge on such aspects of production (Herney, 2013).

### 2.2 Conceptual Framework

The gender relations framework in Figure 1, is an adaptation of the gender relations framework developed by van Eerdewijk and Danielsen (2015). It is a vital tool that can be used to determine gender division of labour, access to or control of resources, household decision making, norms and values (van Eerdewijk & Danielsen, 2015). Taking into full cognizance that women are very important participants in many agricultural commodities value chains, the likelihood that commercialization programs will benefit or burden them needs to be put into consideration. As mentioned by Whatmore (1991), gender relations related to production and its analysis gives concrete information on how to determine the best approaches to promote commodity commercialization. Subsequent to the gender relations framework put together by van Eerdewijk and Danielsen (2015) we analyze the gender roles and the social dynamics attached to accessing production, processing and marketing. In many studies related to gender roles, especially those in agriculture and forestry, gender relations is hardly utilized to analyze the intricacy and changes that occur in men and women’s roles. The Society of Sago Palm Studies (2015) explained that the most comprehensive and labour intensive aspects of sago production in the coastal area is usually done by men, though sometimes assisted by women. Nevertheless, apart from gender, factors related to culture, socioeconomic status, access to finance, demographic factors, raw material supply and market for products could explain the relationships and differences in the practices of actors in food production and its commercialization.

van Eerdewijk & Danielsen (2015) argued that norm and values are one of the factors that existed in both three components (Household Decision Making, Division of Labour and Access to/Control of Resources) of gender relations that can be impacted when changes are introduced. However, in this research, we point out the prominence of norms and values which exist outside of the component factors, looking at its characteristics and the influence it have on the three components of gender relations which has not been particularly considered in studying gender roles in the Melanau communities.

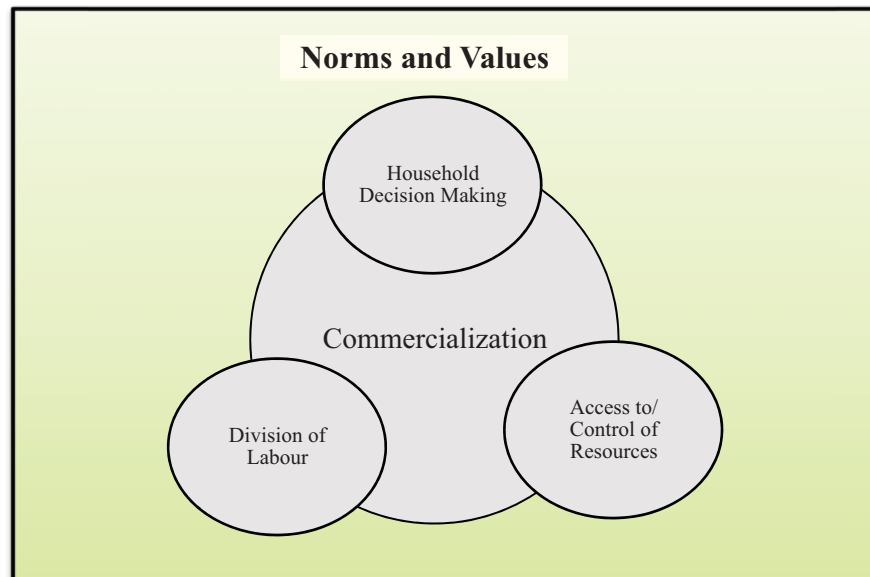


Figure 1. Gender Relations Framework (adapted from van Eerdewijk & Danielsen 2015)

The expected relations, behaviours and traits associated to men and women are fashioned by cultural norms and values. This is due to culture is an independent factor that shapes peoples' activities within households and in the society at large. The function of gender among ethnic groups is a unifying value for the society. This is based on the cultural roles assigned to men and women. It is obvious in terms of gender division of labour, where women have their own clear roles different from that of men within a family circle or in the larger society as well as in terms of decision making and access to and control of resources. Though the explicit nature of gender relations differs in various communities, the universal arrangement is that women are dependents with less capacity to control resources, and restricted power to make decision for themselves and the society at large. However, gender roles are not static and they can be subjected to change over time because the society is also changing.

In the Melanau communities, changes in the production of sago are expected to lead to commercialization of the crop. However, the processes introduced to the farmers showed a diversion of their traditional practices which they are familiar with and have been transferred to them from generation to generation. Though it is a government policy, its impact on the values of the ethnic minority like the Melanau is of great concern to the people either to accept or resist the policy.

### 3. Methodology

Sago commercialization program's impact can be dynamically investigated if the beneficiaries tell their experiences on whether or not they had benefitted from it. Based on the conception that accepting programs are likely to distort gender roles and transform traditional practices are grounded on subjective personal experiences. Therefore, this study deployed a qualitative case approach to pursue the investigation on the impact of sago crop commercialization on gender roles in the Melanau coastal communities. In this regard, this study will highlight how commercialization programs are impacting on the sago producing communities whereby smallholder sago farmers who are mainly men and the sago-based food processors who are typically women. This study is conducted in Mukah Division, specifically in two locations: the coastal town of Mukah and the small town of Dalat situated along the Oya River (Figure 2). The fieldwork was conducted in four phases; two visits in 2015 and one visit each in 2016 and 2017. The length of stay in Mukah and Dalat for each visit ranged from five to seven days. The people observed and interviewed were smallholder sago farmers and their wives, the women involved in processing sago-based food products, women petty traders who sell sago-based food products, several village headmen and officers in Mukah District Office. In the two research locations, the data collection technique utilized was semi-structured interviews, observation and informal conversation. In addition, an interview was also conducted with the officials of Crop Research and Application Unit (CRAUN), a research office on sago palm tree and sago-based food product located in Kuching, Sarawak.

### 3. Overview of the Study Location

Melanau is the fifth largest indigenous group in Sarawak after the Iban, Chinese, Malays and Bidayuh. In Mukah Division, there are five major areas of sago palm, namely Oya-Dalat, Mukah, Pusa-Saratok, Igan and Balingian (Chew, Isa & Mohayidin, 1998). Majority of the people are smallholder sago farmers and fishermen especially those that lives in the coastal areas of Oya, Matu, Mukah and Daro. Figure 2, illustrates the coastal Melanau settlement where sago production is very common. According to the 2010 Population Census of Malaysia, the total Melanau population is 123,410 in which they make up only 6% of the total population in Sarawak.





Figure 2. The Coastal Melanau Settlement and Sago Plantation Area.

#### 4. Historical Background and Development of Sago Palm

Sago palm (*Metroxylon sagu*) is indigenous to Southeast Asia (Sasaoka, Laumonier & Sugimura, 2014). It can be found in abundance in Indonesia, Papua New Guinea and Malaysia (Ahmad, 2014; Scaglione, 2017). The sago palm normal height is around 12-18 meters (Shin & Collins, 2015). A tall sago palm is desired because the source of income is based on the trunk which will be cut into sections with approximately one meter in length for each section.

The rural dwellers, especially the Melanau who are mostly found in the northwest coastal communities of Sarawak with boundary stretching from Rejang Delta to Bintulu are familiar with the farming, processing and use of sago. The starch extracted from its trunk is traditionally consumed by the Melanau as a most preferred staple food beside rice, in the form of sago pearls or *biji sagu* (in Malay language) or *saguk* (in Melanau language). Sago starch has also been traded for over four centuries as export commodity to Brunei, a neighbouring country to Malaysia for cooking purposes. For example, in 1907 it was reported that Sarawak exported 20,388 tonnes of sago from Mukah and Oya areas worth \$964,266 (Baring-Gould & Bampfylde, 2007). Since the early 19th century the revenue from sago export has made rural Melanau farmers prospered (Amir, 2015). However, the export of the commodity did not show tremendous increase compared to other Sarawak's export commodities. For example, In 2012, Sarawak exported 47,849.29 metric tonne of sago products worth \$86,345,004 (Sarawak Agricultural Statistics, 2013). At present, sago export has yet to make a significant impact on Sarawak economy beside other significant commodities including timber, palm oil, rubber and pepper.

#### 5. Sago Commercialization Development Program: Lack of Impact on Male Farmers' Roles?

It is widely acknowledged in the literature relating to gender and rural livelihood that there is a need for active gender participation in food production and marketing (Sunderland et al., 2014). This is highly important for communities who mostly rely on agriculture as their means of livelihood. However, little is known about how initiated agricultural commodity commercialization programs can impact on gender roles in the Melanau communities of Sarawak, Malaysia. The location and climatic condition of where the sago trees are propagated on the Borneo Island showed high potential for it to be cultivated in large commercial quantities even beyond the current 50,000 hectares of land in use which can be a great source of income (Chew et al., 1999). It is in close proximity with Indonesia where sago is also cultivated on about 2 million hectares of land (Koonlin, 1980; Karim, Tie, Manan, & Zaidul, 2008). With this great potential there is still impending concerns over the yield of sago which is inconsistent and low.

In promoting the value of sago, the crop is given an image of "the 21st Century Crop" which is spearheaded by the State Government of Sarawak to promote greater sago yield in both quantity and quality. Both the Federal and Sarawak governments have continuously provided various assistance to the industry and farmers in terms of research, equipments, promotions, farm clearance and management. One of the strategies initiated by the government was the Land Custody and Development Authority (LCDA) which introduced the Sago Smallholder Satellite Estate Development Program (SSSED). It is a land consolidation program which is designed to promote estate-like sago plantation. The program is expected to attract smallholders to join in order to increase the yield. According to one of the officers interviewed:

*Agriculture statistic showed that smallholders' yield is one tonne per hectare in a year which is very low. We estimated that farmers who participate in plantation scheme should be able to produce 50 tonnes per hectare.*

The program provides the smallholders with expertise and knowledge built by the agency in managing the farmers' sago plantation by introducing modern system of farming. The SSSED program provides the service for farmers without any cost within the first five years. However, despite giving such service, farmer #5 mentioned that:

*"I don't engage in SSSED program. I am satisfied managing my own farm"*

SSSED is yet to receive much encouraging response, instead farmers have divided opinions on whether to join the

program or refuse the offer. According to (farmer #1) interviewed, he specifically expressed his disapproval of the plantation scheme because the model of sago farming introduced by SSSSED is a replica of the palm oil plantation where the latter requires more attention, fertiliser, good drainage system, weeding and clearing of old leaves. He claimed that sago farming is the opposite of palm oil plantation. For instance, SSSSED farming standard requires building of solid drainage system whereby traditional way of farming sago does not require this. In addition, (farmer #8) also have some reservations as he did not agree with the SSSSED’s opinion on the clearance of surrounding area before planting sago trees. He said that:

*“Sago tree can live alongside with other plants or weed.” We don’t have to clear the surroundings.”*

The study argued that these farmers’ voices of disapproval relate to the changes in farming practices which has been embedded in their daily lives where they have full control of their farms. The implication of this for them is that, if the smallholder sago farmers join SSSSED, the agency will be in total control and it will determine their farming practices. Hence, the autonomy they enjoyed on the land they owned may be restricted. Since peasant society operates in a natural environment, such form of control will disrupt farmers’ everyday task. These means that farmers will no longer have control of certain farming practices which has been transferred to them for generations.

**5. Result and Discussion**

*5.1 Gender Roles and Sago Commercialization: What Impact?*

To understand the impact of sago crop commercialization on gender roles, this study investigates the roles of men and women in the sago sector. The focus capitalized on the use of gender relations framework which critically examines gender division of labor, control of resources which includes income generation and household decision making. As The study has argued earlier, their farming practices are embedded in value and norms of the community. In Malay language, the ‘smallholders’ are commonly referred to as *pekebun* or farmers and *penanam* or cultivators where these words can be used interchangeably when addressing smallholder farmers in the sago, rubber and oil palm sectors. Evidence from the fieldwork revealed that Melanau smallholder sago farmers feel more comfortable when addressed as *pekebun balau* (sago farmer). The reason is that they felt they do not cultivate the sago tree, instead they inherit the tree from their past generations since sago trees are reproduce from its suckers.

More importantly, sago farming is traditionally and still regarded as part-time job. In terms of working days, normally farmers work two to three days in a week. In addition, they will not work in their farm if there is death in the village or if they receive ‘a bad sign’. If framers ignore the sign, they believe that they will receive trouble later. One of the farmers shared the cultural of sago farming, she said:

*“Normally we work for three days on our farms. If there are unpleasant signs in the jungle which serves as signal to us that something is wrong and we need to be careful or cancel our working day i.e. a weird smell which signifies death of a villager or when a snake lies down horizontally or when a bird perches on the ground.”*

Despite the bright future of the sector, the younger generation is not showing interest in carrying on with the occupation of sago farming. This is due to the exposure through education, migration and inter-marriage. The research findings revealed that the majority of smallholder sago farmers are at the older age; either they are originally farmers or become smallholders after retired from working in other sectors. However, many of them work with their spouses and hired lumberjack for the job of felling the trees and send them to the mills. This qualitative data is supported by a survey of 308 farmers in Mukah where 65.9% smallholders are in the age bracket of 55 and above. (Figure 3). The older farmers who reach 60 or 70 years old are normally engage in lighter roles such as weeding and pruning. Meanwhile felling trees which is a heavier task is given to hired lumberjacks.

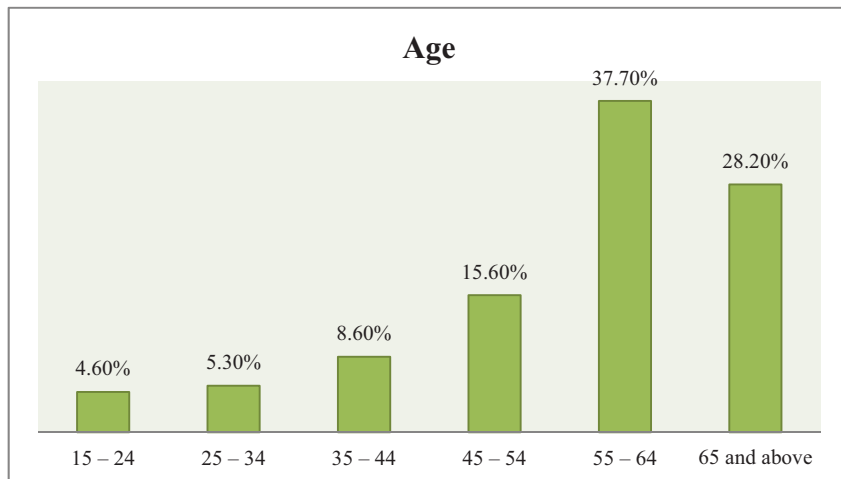


Figure 3. Melanau Sago smallholders’ age bracket (source: Awang Hamdan, Yaakub, Mohamad Naim, 2017)

### 5.1 Control and Ownership of Sago Farm Lands & Household Decision Making

As seen in many rural communities, men are considered as heads of households and decision makers. They always take control of the land used for agricultural production and every decision pertaining the utilization and management of land rests with them as long as they are still competent and alive (Villamor, et al., 2014). In the Melanau communities, men and women can own sago farm lands either by purchase or inheritance and it is also transferable from generation to generation. The sago farm owners are mostly regarded as the smallholder sago farmers and they are mostly men and breadwinners of their families. Usually, the men dominate the cultivation and management of sago farm lands and they also determine the marketing strategy and distribution channel of sago logs to factories that process the starch. Although women also own sago farm lands mostly by inheritance but one interesting fact is that Melanau women relinquish the control of their farm lands to their husbands or they jointly manage it as a family business. It is due to their marital relationships may allow a woman to benefit from her husband's assets and vice-versa. In this case, women are unable to stand by their decision regarding their farmland should they have different opinions.

### 5.2 Division of Labour

According to GLOPP/ILO (2008) gender division of labor is the way work is divided between men and women based on their gender roles. Sago production is tedious and labor intensive. The entire value chain of its production requires extra labor which is sometimes beyond the capacity of what a husband, or husband and wife alone can handle especially in the aspect of harvesting and processing of the sago palm. In this situation, the husband, wife, other family members and short term employees are required. It is customary, the responsibility of the husband being the head of household, to determine who and who within and outside the family circle should participate in the sago production. In Mukah and Dalat, it was discovered that cultural norms and values played important roles in gender division of labour. According to the tradition, men usually take responsibility of tasks that needs more strength and higher physical effort such as pruning, cutting and pushing of logs, steering and maintaining of boat as well as manual debarking. These are some of the activities that require special skills and the agencies should take responsibility to train smallholder sago farmers on better methods of carrying out all these tasks. The men are also saddled with the responsibility of seeking buyers of their sago logs, making business contacts regarding general logistics and transportation to sago mills.

The tasks are not exclusively carried out by the men as women also assist in less physical intensive activities such as weeding, making simple drainage, pushing of log and extraction of sago starch for household utilization or domestic markets. In Mukah and Dalat, when men are busy on the farmlands, women would engage in household activities such as cooking, cleaning and taking care of children which is culturally constructed as women's responsibilities. They also participate in other agricultural activities as mentioned by female smallholder when she said: "*I plant pumpkin, yam, corn, cucumber and pineapple.*" For the women who own sago farms, they also face time management constraints, they don't usually have the time to efficiently participate in innovative sago production and processing trainings organized by the government and this further hinders them from attaining commercialization level.

### 5.3 Income Generation and Access to Financial Resources

For the women, they process sago flour into the Melanau's traditional staple food known as sago pearls which is produced either for consumption or commercial purposes. Not only that, they also produce other food from sago such as *tebaloi* (sweet, crispy cracker), *tepung lemantak* (wet sago starch flour) and *tumpik* (sago pancake). However, majority of the women do not process sago pearls for consumption and they have to buy sago products from other women when they are short of supply. For those women who produce in large quantities, it can be a source of income for them to supplement their household expenditures. The process of making sago pearls is very tedious and requires up to 10 hours in most cases to process. These include mixing sago flour with desiccated coconut (which is prepared a day earlier), coconut milk and paddy husks before it is shaped into tiny ball-shape pearls. *Saguk* is not roasted in the household kitchen, instead it is roasted in the makeshift hut called *belanga* with a hearth made from clay. In our visits to Mukah and Dalat, many households do not have *belanga*. Thus, the women who do not have their own *belanga* will always rent it from the other women to make their *saguk* whenever they are in need of it. The Melanau women can produce up to 60 kg (3 tins) of *saguk* at a time.

The income generated from sago logs is either managed by men or women. Majority head of household smallholders earn between RM500 to RM1,000 a month from their sago plantation from the logs mostly sold through agents. The finding is supported by a survey of 308 Melanau smallholders who are mainly male in Mukah by Awang Hamdan, Yaakub & Hafizan, (2017). The lower income farmers have their 'safety net' when they typically consider their sago palm trees as their 'bank savings'. Sago palms trees will be harvested whenever the owner requires extra money for larger expenses such as wedding reception or paying their children education fees. Some of them are also involved in non-agricultural jobs such as small trading and commercial lorry driving. This means that the majority of smallholder sago farmers do not rely solely on sago production as their primary source of income.

In addition, some smallholder sago farmers also work as lumberjacks or *penebang*. In terms of earnings, they are the lowest earners. Women in the household of the latter category are more involved in income generating activities to supplement their household income. A female smallholder for instance, she had the experience of working in the sago farm land helping her husband. At the later age, she produced sago pearls for commercial purposes. When discussing issues related to income generated from sago business, many women interviewed in Mukah and Dalat noted that sago

is adding to their family income and helping them to take care of their basic needs in their own little ways. For instance, informant #12, a woman in Dalat, mentioned that:

*“Sago pearls is my source of income, if I don’t make sago pearl, I can’t help to fend myself and my family”*

While informant #9, a smallholder woman, explained that she uses the income generated from sago production for *“savings, other business capital and for personal expenses.”*

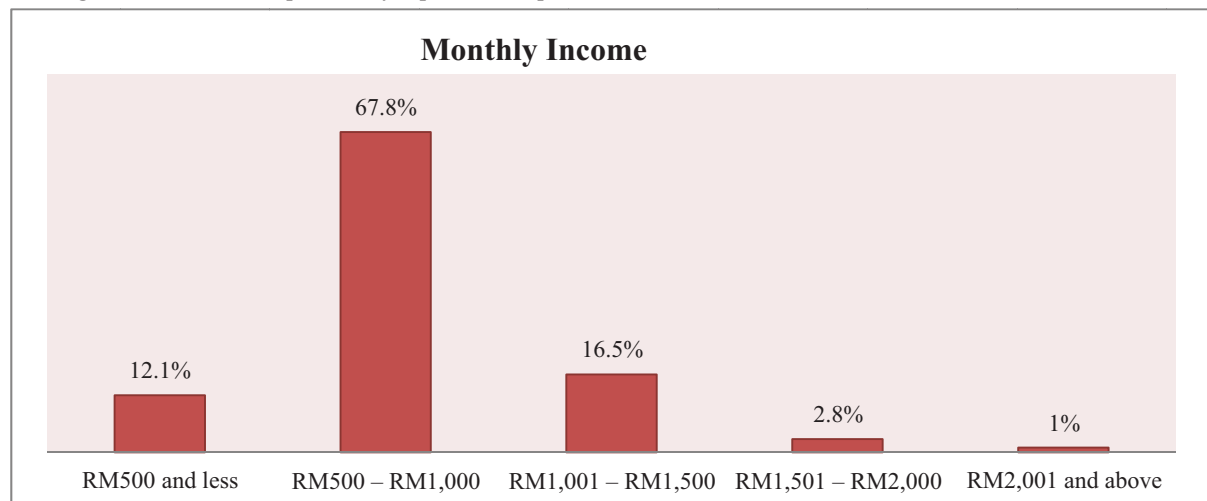


Figure 4. Melanau Sago smallholders’ Monthly Income (source: Awang Hamdan, Yaakub, Mohamad Naim, 2017)

There is another characteristic of Melanau smallholders where some of them had worked at logging companies in Miri for many years during their younger age before they returned back to their villages. During those times, they were paid good salary but their working period is only four months in a year. This is confirmed by Amir (2015), when approximately 5 per cent of Melanau population in Dalat work as loggers in 1970s and 1980s. According to a male smallholder, initially, he did not possess any sago farmland but that change when he worked in a logging camp in Miri for some time to accumulate wealth. Later, he purchased a total of 12 hectares of farm where he planted sago palms while his wife, purchased 9.5 hectares of land with sago palms planted on it.

In the study, it was generally pointed out that women have limited access to financial resources to purchase land and equipment to boost their capacity for commercialization but they have adequate control of their little income, in the sense that they can buy whatever they need with their money provided they have it. Further, for the sago palms that belong to the women, not many of them utilize the income they generate from their previous production to continue and invest in cultivating sago. From observation, the Melanau people who participate in sago production and marketing do not usually crave for luxury lifestyle as they are mostly contented and happy with their ways of life. This observation is supported by a survey below (Figure 5) where more than 70% household expenses are RM500 and less. Many farmers also don’t really buy the idea of sago modernization initiative because they feel the traditional method still remains the best as well as their idea of sago farming as part-time job instead of full time job.

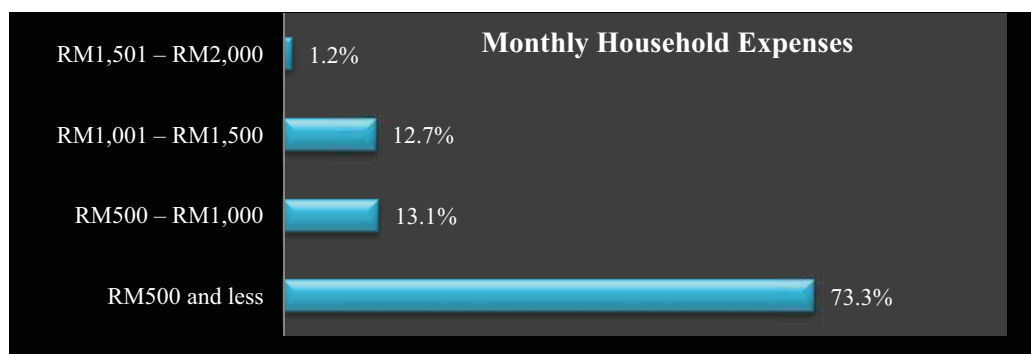


Figure 4. Melanau Sago Smallholders’ Monthly Income (source: Awang Hamdan, Yaakub, Mohamad Naim, 2017)

**6. Conclusions and Implications for Policy**

This study has focused on the impact of gender roles on sago crop commercialization in the Melanau communities of Sarawak, Malaysia. The study has applied the qualitative research methodology guided by the gender relations framework to investigate the roles of men and women and the on-going commercialization programs designed by the

government to develop the sago sector. On the one hand, it is undeniable that after more than three decades of sago development, research and commercialization programs supported by the government agencies have thrived. On the other hand, this research found that the respond from smallholder farmers are rather slow. In order to speed up the process, it is suggested that communication between related agencies and smallholders need to improve in order to avoid miscommunication in message dissemination (Naim, Yaakub & Awang Hamdan, 2016).

The sago logs produced by the Melanau communities are for their consumption, domestic markets and export. Mostly, control and ownership of sago farmlands lies greatly with the men, even though, women can also own sago farm lands either by inheritance or purchase and can be transferred from generation to generation. However, women are less involved in decision making although they may have idea that support the sago commercialization program. In the aspect of division of labour, men and women participate in the sago farm lands regardless of who owns the farm land between them. Meanwhile, in the aspect of income generation, men control the income they generate from sago logs and the women control the income they generate from processing and selling of sago-based food. Further, it is commonly practiced that women own the income from farm land belongs to the women and managed by the men. Nevertheless, from all indications, Melanau women are very loyal to their husbands when it comes to issues related to the sago sector. Complementarity gender roles are clearly founded in explaining Melanau male and female gender relations. Moreover, Melanau people who participate in sago production and marketing don't usually crave for luxury as they are mostly contented and happy with their ways of life.

The fact that sago is traditionally cultivated and used as a staple food widely consumed locally by the Melanau people, aggravated the reluctance of farmers in giving away the traditional method of producing and processing for the modern method. In addition, the men and women are not so keen about wealth accumulation resulting in commercialization of sago is more difficult to achieve. At the same time, the attitude of younger generation who do not want to continue with the culture of cultivating sago serves as the major constraints that hinder the successful commercialization of sago in Sarawak, Malaysia. This empirical study confirmed that the majority of male farmers are still very much comfortable with their traditional method of cultivating sago. It also revealed that the indigenous Melanau dwellers have not showed keen interest in participating as competitors among sago mill owners and as such their gender roles of production still remains at sago farming and sago-based food processing level.

The research implication of this on commercialization of sago sector is that gender roles should be paid more attention so as to lift the industry from low production to a commercialized level. This includes intensifying effort to motivate the younger generation to consider participation in the sago industry. Empowering more men and women through trainings on land management is highly recommended so as to see commercialization as a beneficial tool that will increase income and improve welfare of household. The central problem associated with commercialization is that these smallholders viewed these changes distort their cultural norms and values in the sense that the indigenous knowledge they acquired and transferred among themselves from generation to generation could be replaced with modernized ideas coming from the commercialization program. No doubt, traditional norms and values can have serious influence on the acceptance of commercialization strategies. The interventions of the government through its many agencies may fail if they do not strategically blend the innovations with the cultural norms and values of the Melanau people. Therefore, it is recommended that the government should intensify their effort towards ensuring the capacity of men and women are built for the commercialization of the sago sector that take into consideration the socio-cultural aspect of norms and values of the Melanau smallholder sago farmers.

### Acknowledgement

The research and findings presented in this paper, are the outcome of the collaborative fieldwork and review of literature carried out by the three researchers mentioned above in the title page, who are staffs of the Universiti Malaysia Sarawak. Funding for the impact of sago crop commercialization program on gender roles was provided by Tun Openg Chair, Centre for Sago Research, Universiti Malaysia Sarawak.

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# Pedagogic Perspectives on Chinese Characters Teaching for Latin American Students

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Received: October 11, 2017

Accepted: October 26, 2017

Online Published: November 28, 2017

doi:10.5539/ass.v13n12p45

URL: <https://doi.org/10.5539/ass.v13n12p45>

## Abstract

Chinese characters are one of the most representative components of Chinese language. However, due to its complexity, the teaching of the language has become an important research topic. With the expansion of this language, it is important to analyze and reconsider approaches to inspire and guide students with different cultural backgrounds, languages and learning habits, and highlight their advantages and disadvantages. Based on two beginner level groups of Chinese in Mexico, this report analyzes teaching strategies, pedagogical activities and students' attitudes towards two professors, a local Mexican teacher and a Chinese teacher. After observing both classes we found significant differences on their approaches to teach Chinese characters. The Chinese teacher emphasized the importance of characters as a communication tool and therefore tried to develop accuracy and efficiency, while the Mexican teacher focused on knowledge about characters, the association with students' own experiences and self-directed learning techniques. We conclude with making remarks about which of these teaching approaches are more suitable for the teaching context of Chinese language in Latin American countries like Mexico.

**Keywords:** Chinese characters, teaching approaches, Chinese teaching in Mexico

## 1. Introduction

The writing system of Chinese characters is one of the most complicated writing systems in the world and probably the richest one in historical and cultural content. It is also a strong impetus for students globally who decide to learn Mandarin Chinese with the goal to come to read and write the language. However, the Chinese writing system is considered the principal challenge for students who have only mastered alphabetic writing systems (Everson, 2011). How to teach Chinese characters has become a major research topic in the teaching of Chinese (Li & Ruan, 2012), and still remains to be an area of constant debate because of the variety of research results and different analysis perspectives, especially in the case of foreign learners of Chinese.

At present thousands of students are learning Chinese in Latin America. They are attracted to learn this language not only by the rapid development of Chinese economy but the deep interest in learning a language and culture so distinct from their own (An, 2017). Since learning the Chinese writing system constitutes a challenge for both teachers and students, it is important to analyze the teaching efficiency and the way that teachers and students perform and participate in the pedagogic process. This article presents a descriptive analysis of different methods in teaching characters to beginners based on two case studies of Chinese Mandarin courses in Mexico, and discusses different pedagogical approaches that can be implemented during the teaching of Chinese characters in Latin American countries which have an education system and culture different from that of China and other countries such as the United States.

The Chinese writing system is a logographic system that represents a concept corresponding to a word or part of a word through a graphic representation (Huang & Liao, 2007). In Chinese, a character represents the sound of a syllable. However, it is not strongly associated with the sound of a particular syllable as it is in phonetics-based writing systems. The independence from pronunciation makes it impossible to transcribe spoken language if one does not have the knowledge on how to write each word in its context. This is the main reason for the high difficulty in learning to read and write the characters, but the writing system brings benefits that were of vital significance in history as it creates the possibility to achieve communication between people from different regions where various dialects are spoken, and to attain the understanding of texts in different eras.

Although learning the Chinese writing system is much more complicated than a phonetics-based one, the characters have common characteristics that facilitate comprehension and learning, which are employed by native and non-native learners of Chinese (Shen, 2005). Within a character there are components and radicals appearing in different characters that usually share some aspect in common. It can correspond to similar phonetic aspects or some semantic relation, for example 饭 (fan4) meaning food contains two components with a left-right structure. The left part indicates semantic information as it relates to food and the right part 反 (fan3) meaning inverse is related to the



pronunciation of the character.

In the case of teaching characters to adults who are accustomed to using an orthographic rather than logographic system, there is a constant debate on how the characters should be taught, including the optimal time for character teaching (Ye, 2013), the efficiency of the use of visual and phonological mnemonics (Kuo & Hooper, 2004), radical analysis (Taft & Chung, 1999; Shen, 2007), effectiveness of stroke-order learning (Hsiaung, Chang, Chen, & Sung, 2017) and the use of electronic resources in character learning (Lam et al., 2001).

Although comparisons of different teaching approaches have been made, results of these researches are only applicable to a few aspects in character teaching. They guide teachers in the effectiveness of different exercises and help teachers to make an informed decision in the design of the teaching plan based on the course objectives and the characteristics of the students. Nevertheless, few research has focused on the macroscopic aspects regarding pedagogic approaches and objectives in the process of character teaching.

This article is based on observing classes of two first-level groups of Chinese language in the Confucius Institute of the National Autonomous University of Mexico (UNAM) and analyzes the process and results of different teaching methods employed by two teachers in order to know how they affect the acquisition of knowledge, obtainment of skills for character recognition and writing, as well as changes in student attitude. The aim of this article is to present the complexity and importance of research on Chinese character teaching and to highlight aspects that should be taken into account when taking an approach to the teaching of this writing system.

## 2. Case study

### 2.1 Objects of analysis

We observed pedagogical activities in two groups of first-level Chinese course from week 2 to week 8 in the spring of 2017 at the Confucius Institute, UNAM. Opinions and comments from students and teachers were collected. During this period, students began to learn characters related to basic daily communication. Both groups used the same textbook *Hanyu Jiaocheng (Course on Chinese Language) Vol. 1 Part one*, which covers the basics of the language and elementary communicative skills such as shopping and ordering food, and requires students to master about 60 characters. An important aspect to be mentioned of this book is that it does not take into account the difficulty of characters. It is organized based on grammatical concepts and communication needs, so the teachers can modify the teaching sequence to reduce difficulty of the course. Group A had 23 students and was taught by a local Mexican teacher, while group B had 25 students and was taught by a teacher of Chinese nationality. Both teachers have more than 5 years of experience in teaching Chinese.

### 2.2 Case description

Below is a description of highlighted parts of both classes. The contents related directly to the teaching of characters will be analyzed especially in the following aspects.

#### 2.2.1 Teaching objectives and methods

Through a brief interview both teachers were asked how they thought the teaching of characters should be and a summary of their answers is given below:

Group A: The teacher believes that the learning process must be as active as possible, trying to arouse the interest and attract the attention of the students so as to allow learning in advanced stages to be simpler and self-directed, and to help students remember and give them a wider context. She mentioned, "I try to relieve stress from the classroom where we can talk freely about the characters so as to make students feel that the Chinese characters are not too difficult, because they were also hard for me when I was a student. In this way I try to give them a message that they can adopt whatever methods that suit them the best to learn characters."

Group B: The teacher bases the class on her knowledge of the language structure and believes that it is important to learn characters in an orderly way and pay attention to details of the characters. She said, "The characters you learn in the first-level period will be the basis for later stages, so it is very important for students at this stage to know well how to write characters, including the basic strokes, stroke order, the radicals and their meaning, and the size and proportion of each component of the characters. If not, it will be difficult to get rid of bad habits later. Also, practicing writing ensures that you learn to read quickly."

#### 2.2.2 Ways to introduce and teach the characters

Group A: In the beginning of week 2 the teacher explained the differences between orthographic and logographic writing systems, giving several examples of cultures employing logographic systems, particularly the Maya civilization as reference which developed in Mexico and Central America. The Maya people used glyphs to represent concepts which in turn were related to the sound of a syllable just like Mandarin Chinese. The teacher gave the example of the word *montaña* (mountain) (Figure 1) to show the similarities in the logic of the characters (a pictorial representation associated with a concept) and that the Chinese writing is not very complex compared to the Maya system, in which each symbol has many more details as can be seen on the character mountain. She also made use of the reference to the Maya writing system to elucidate another similitude between Chinese characters and Mayan hieroglyphics. The use of meaningful components or radicals to form new symbols reduces learning and writing difficulty as shown in Figure 2 where the component of the Mayan word *ik'* is inserted at the center of another

component which represents a day, forming the word “day of wind” in the same way that the mouth radical 口 (kou3) in Chinese can be inserted into the door radical 门 (men2), forming the word 问 (wen4, to ask). After the historical introduction and presenting the meaning of some basic character 人 (people), 山 (mountain), 日 (sun) and 木 (wood) the teacher did not give any direct information on characters but carried out various activities on the interpretation of characters and radicals in which presentation was given by the students.



Figure 1. The word mountain in Mayan and Chinese

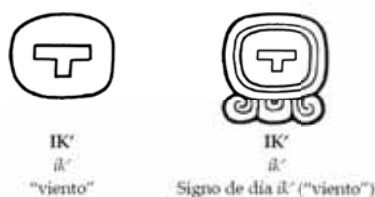


Figure 2. The word *ik'* forms “day of wind”

Group B: The teacher introduced characters as the only writing system that is valid in China, highlighting its importance with respect to the phonetic transcription *pinyin* and emphasizing that the characters required attention and mastery of basic strokes and stroke order. The first two weeks stroke exercise was carried out, in which students learned the shape, direction and name of each stroke in written Chinese. In later classes, after orally learning the meaning and use of new words of each lesson, the teacher demonstrated how each character should be written. While the teacher wrote a large-size character on the board she pronounced the name of the radicals appearing in the character to help students recognize the components. She emphasized the proportion, attention to details and the need for practice so as to finally master the characters.

### 2.2.3 Class activities

Group A: Prior to the beginning of each lesson the teacher presented objectives of the lesson and a list of required characters. The characters were divided into several groups and each group was assigned to a student. The teacher asked the students to search in any medium where they had access to an explanation why the character and its components are written that way and present it to their classmates in the next class. In the next class students presented their research results and discussed among them which one was the best. This strategy was repeated three times during the six weeks when the class was observed. The resources used by the students included dictionaries, web pages, Chinese friends and their own imagination.

Another activities that involved the use of characters were a lottery game created by the students (a Mexican traditional game similar to the game Bingo) and the creation of dialogues similar to those in the textbook by writing sentences freely on the board and acting out the created dialogue.

Group B: After introducing each character in the lesson the teacher asked the students to write down the characters in the notebooks following the stroke order, and checked the characters one by one.

One week after the completion of a lesson the teacher gave a dictation of the most important characters and sentences so as to evaluate the students' progress in learning the characters and correct the errors that they might make.

In addition, character and radical recognition games were organized in which the teacher mentioned a word or radical, and the students competed in turns to beat the corresponding characters or radicals on the board, earning points for their team.

### 2.2.4 Homework

Group A: The most frequent homework was described in class activities Group A that students made use of network resources (including videos, forums and online dictionaries) and even used their own imagination to find concepts that helped them associate the characters with their sound or meaning. On other occasions the teacher assigned homework of completing textbook exercises using characters.

Group B: The teacher assigned homework of copying characters and sentences for each lesson.

### 2.2.5 Error correction

Group A: There were no errors in the students' presentation on the meaning of the characters since the key was to find

a way to remember and associate. Therefore, even if the presented explication did not match the historical origin of the character, it was still instrumental for students to remember and comprehend the logic of the characters, which motivated them to present different interpretations without being afraid of errors, for instance, when studying the character 文 (wen2, culture) students offered several interpretations:

“文 has to do with the first characters that were written in tortoise shells, so the character for writing and culture is represented with a turtle.”

“Culture is what gives you identity. It is like a big tattoo that you have written on your chest.”

“People who had culture and knew how to write were those with a lot of money and ample clothes like the person that seemed walking in the character wearing a large robe.”

Some of the interpretations were based on the students' imagination, which is not necessarily the official origin of the characters, but were accepted as useful in order to understand the characters.

In the exercise of writing sentences on the board the students made multiple mistakes in writing the characters. The teacher asked all students to look for the error and to correct it together.

Group B: All the mistakes on shape, strokes and proportion were pointed out by the teacher, sometimes orally while checking the students' writing in class and sometimes marking the mistakes in the homework or dictation.

### *2.3 Assessment results*

All students who regularly attended the class in both groups passed the assessments in the period when the class was observed, though a notable increase of writing speed and improvement of character quality could be seen in group B.

### *2.4 Opinions and attitude of students*

Students were asked to write a reflection at the end of week 4 and week 8 about their learning experiences, including their opinions about the teaching methods, how much time they spend in learning Chinese per week, difficulties they encounter, progress they have made and overall attitude towards the course.

At week 4, the reflection showed no big difference between two groups. One of the common difficulties mentioned by students was the characters, but most of them remained positive that they would be able to master them one day. However, at week 8, differences of students' attitude towards their own progress in characters could be noticed between group A and B. Students from group A still demonstrated strong interest and confidence in learning characters since they were accustomed to looking for information themselves while students from group B showed more complaints with 15 out of 25 mentioning that they might not have enough time to practice the characters and doubted whether they could learn to write the characters someday.

## **3. Discussion**

The teaching results of both groups can be considered a success because the general objectives of the course were attained and most of the students understood the required knowledge as shown in the assessments and had a positive opinion towards both courses. However, it is easy to observe that there are great differences in the teaching approaches, which are highlighted by the educational customs and are worth discussing.

We do not attempt to point out that the teaching methods of both teachers are representatives of local teachers or teachers of Chinese nationality. The observation allows us to analyze ways that can guide the teaching of Chinese characters and their advantages respectively.

Throughout the courses we can see that two aspects of character were developed: ability to read and write and knowledge about reading and writing. The Chinese teacher in group B put a remarkable emphasis on the development of writing skills, sought to achieve the course objectives stated in terms of language acquisition and did not explicitly show the focus on the development of cross-cultural communication abilities, cultural knowledge or learning techniques, while the Mexican teacher in group A put more attention on knowledge about the characters themselves and the ability to analyze them, taking her own learning experience as a reference.

In terms of foreign language acquisition a clear distinction has been made between language learning and language acquisition (Krashen, 1984), since metalinguistic knowledge is not so useful in developing students' communicative capacities as constant communication (including reception and production) of comprehensible messages in the target language. Although acquisition of the writing system follows very distinct mechanisms from those of spoken language, this communicative approach can be effective in reading and writing for several reasons. The memorization and recognition of characters is a process that requires constant practice. The brain should be able to access information on the shape of the characters and the procedure to write them at a relatively high speed. This process can be trained by means of continuous writing, like the teacher did in group B through repetition tasks and by writing characters on the board slowly while pronouncing the sound of the character with the students following her. In this way, students tried to reinforce the connection between the movements, the image of the character and its sound or meaning in their brains by means of Hebbian learning, in which signals that are triggered simultaneously or sequentially in the brain are reinforced, increasing the possibility to repeat the signal sequence in the future.

This kind of training was completed during the learning of some characters in group B, where the learning of characters managed to keep pace with that of spoken language, and characters were written with great care in aesthetic

aspects and with higher speed. However, a problem emerged as students progressed in the study of the language as can be seen in group B students' reflection at the end of week 8: 60% of the students mentioned the problem of study time, saying that they probably would not have enough time for practice in the future.

The time problem in the study of characters is a fundamental problem and there have been experts who for this reason consider that the ability of handwriting is not imperative in the study of Chinese and Japanese because of the time it takes and the electronic tools that are currently available (Allen, 2008). It is a principal problem in the repetition-based teaching techniques as those analyzed in group B. Although the pace of progress in the spoken language of the first level is slow owing to the study of pronunciation and basic grammars, the students feel that they do not have sufficient time even to only memorize the most used characters. This strongly discourages students who have learned Chinese for only two months as can be seen in their comments.

The teacher of group A focused more on learning knowledge about writing and acquiring skills to learn and recognize characters. Although it is clear that the main purpose of this knowledge is to obtain writing skills, the teacher did not spend too much time in or out of class on the practice of characters. However, the students achieved similar results to those in group B. There may be several reasons. First, the students are adults who know the way they learn effectively. Second, they have the ability to copy characters or make strokes since everyone knows how to write in Spanish. The training in stroke direction or copying characters may be more applicable to children who do not yet master the use of a pencil, but for adults who have limited time and know how to write, it does not necessarily need to spend so much time on this kind of practice or orientation.

The knowledge imparted by the Mexican teacher did not directly help the students understand more words but arouse their interest and intention in details, linking characteristics of the characters to something with which the students are more familiar such as the Maya writing that is more close to students' life since it was introduced in primary education in Mexico. In addition, the rest of the information concerning characters were presented and discussed by the students themselves, making the class an active place of conversation where students could discuss history, their problem in searching information and even joke with one another. It helps to reduce classroom stress and is beneficial for language acquisition in both oral skills (Philips, 1992) and writing skills (Rai, Loschky, Harris, Peck, & Cook, 2010).

The use of additional resources in group A encouraged students to be independent in their learning, which is conducive in language learning since the amount of information and skills to learn is high and one cannot depend totally on teachers, particularly in the teaching of Chinese in Mexico where class time is limited and class size is big, making it difficult for teachers to give individual attention.

The discussion among peers and use of their own resources are methods that accord with constructivist principles of education which have demonstrated efficiency in knowledge transfer and motivation (Schunk, 2012). They are fundamental in character learning that requires analytical skills and a longer learning time than many other writing systems even if students only try to obtain reading skills. In this way the teacher of group A played the role of facilitator, orientating discussions while the students helped each other to understand the difficult parts of characters, creating a scaffolding structure to achieve utmost learning, according to Vygotskian theories of social learning (1978).

Another factor that affects the motivation and perception of the difficulty of characters for the students lies in the pressure to master a correct form of writing. The teacher in group B paid great attention to see if the characters were as correct as possible, directing students' attention to even aesthetic details of the characters. In addition, she exerted pressure on the weekly dictation, in which students always scored low. The dictation and continuous evaluation of results are a highly efficient method to consolidate concepts and abilities in long term memory, surpassing the efficiency of elaboration on concepts in many other cases (Karpicke, 2011). However, this efficiency can only be achieved when the students have already had the knowledge and comprehend it in an efficient manner. In the dictation of group B, many students did not have sufficient time to learn, resulting in bewilderment in their pace of progress. In group A, character exercises were carried out in teams and errors were marked by students themselves without receiving a score, which avoids students from perceiving a high difficulty in the learning process or hurting their self-esteem.

In general the differences between both groups lie in how the teacher perceives the learning of characters based on their own experiences. The Chinese teacher learned the writing system when she was a child and has the knowledge of the language, culture and basic concepts of writing. The reading and writing skills allow her to transcribe what she means to communicate, which takes a long time to obtain. The Mexican teacher has studied a long time in Mexico, learning the spoken language, writing and culture at the same time, thus she believes that students do not necessarily have to spend all their time on practice this ability, and takes practicing characters as an opportunity to relax the class and talk about history and interact with students, which was not the focus of group B. Follow-up research on the use of these two approaches will be useful to identify students' learning outcomes.

#### **4. Conclusions**

The teaching of Chinese writing system can be developed in different ways. However, the system is not only an auxiliary of the language. If it were only a transcription tool, it might have been abandoned a long time ago, since it is a difficult system and takes time to master as can be noticed when students do repetition exercises. The Chinese characters are a fundamental element that gives identity to the language and constitutes a great part of the Asian culture.

Therefore, learning the language is not merely a process of memorization and automation in the process of recognizing and writing the necessary symbols for the purpose of communication. Because of its logographic nature, each symbol and its components can be directly related to concepts at a sub-morphemic level that is not necessarily associated with a sound. The concepts reduce the difficulty in the learning process and help students to understand important elements of Chinese culture and history which in turn can become an additional tool for memorization and creativity in a practical way.

The acquisition of this knowledge in the cases analyzed in this article not only helped to arouse students' personal interest in knowing more of this writing system, but was also conducive to reduce the complexity perceived by the students in the writing process. In Latin American countries like Mexico where students usually take a great interest in active class and attend Chinese classes out of interest in learning a new culture, an active learning approach where students learn and comprehend to seek connections with their own knowledge and resources may be more efficient and attractive in the long run.

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# Relationship Value and Relationship Quality: An Exploration of Its Antecedents on Customer Loyalty

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Received: October 12, 2017

Accepted: October 31, 2017

Online Published: November 28, 2017

doi:10.5539/ass.v13n12p51

URL: <https://doi.org/10.5539/ass.v13n12p51>

## Abstract

The aim of this study is to examine relationship value and relationship quality, and its effect on customer loyalty in the context of relationship marketing. Four key relationship value variables of economic value, service value, relational value and social value are examined in this study. The study focuses on the Malaysian telecommunication industry and based on the business-to-customer environment. The structural equation modelling technique is used to empirically test the proposed hypotheses using a sample of 350 customers collected by a questionnaire survey. The results showed that three relationship value variables of economic value, service value, and social value have significantly influenced relationship quality. Customer loyalty is significantly affected by relationship quality. There is no significant effect of relational value and relationship quality. The contribution of this paper is twofold. From a theoretical perspective, the social exchange theory is used to explain and conceptualize relationship marketing paradigms. It offers both a conceptual foundation and empirical-based evaluation of customer loyalty through the context of relationship value and relationship quality. The relationship value dimensions of economic value, service value, and social value is the antecedent to relationship quality, which lead to customer loyalty. In the practical perspective, the findings proposed that the telecommunication service providers should focus on relationship value through providing better value for money packages, innovation of services and improve social interaction with customers to build stronger relationship quality and achieve customer loyalty.

**Keywords:** relationship value, relationship quality, customer loyalty, relationship marketing

## 1. Introduction

Over the last few decades, relationship marketing has emerged in response to the challenging and competitive contemporary business environment. The focus of relationship marketing is to build, maintain, and expand customer relationships and to preserve corporate profit levels (Grönroos, 2017a). Relationship marketing is widely practice across many business-to-consumer contexts and it has contributed to diverse organisational benefits in the aspects of greater profitability (San Martin, Jimenez & Lopez-Catalan, 2016), customer loyalty (Evans & Laskin, 2008; Marzo-Navarro, Pedraja-Iglesias & Rivera-Torres, 2004), and competitive advantage (Catalina, 2013). Researchers have coined the term “relationship value” and “relationship quality” to explain the effectiveness of relationship marketing in the context of business-to-customer relationships. According to Ravald and Grönroos (1996), relationship value is an important constituent of relationship marketing. Relationship value is an antecedent to relationship quality and consumer behavioural outcomes in relationship marketing (Ulaga & Eggert, 2006). Furthermore, relationship quality is the antecedent of customer loyalty and successful relationship marketing (Prince, Palihawanada, Davies, Winsor, 2016; Jin, Line & Goh, 2013).

The telecommunication industry is one of the fastest growing industries in Malaysia. Malaysia Communications and Multimedia Commission (MCMC, 2016) reported that the total cellular telephone subscribers in Malaysia have reached 43.9 million at the end third quarter of 2016. The strong consumer base in the telecommunication industry has resulted in the increasing focus to build effective relationship marketing by the service providers to achieve customer loyalty. However, competition between the key telecommunication service providers, such as Telekom Malaysia, Maxis, DiGi, Celcom, and U Mobile, has been intensively strong in the recent years. In the first quarter of 2017, Maxis, DiGi and Celcom faced the situation of declining number of subscribers, and this has resulted in their revenue contraction. The ongoing price wars between the service providers to defend their respective market share suppressed margins (The Star, 2017). The intense price wars between the service providers have caused consumers to opt for better value packages at a lower price, as well as other value benefits. With that, the effectiveness of the telecommunication service providers to achieve customer loyalty is highly questionable.

Past studies have found that relationship value leads to higher customer commitment and loyalty (Geiger, Durand, Saab Kleinaltenkamp, 2012; Sun Pan, Wu & Kuo, 2014). Furthermore, many scholars also found that customer loyalty

is highly influenced by relationship quality perceived by the consumers (Bojei and Alwie, 2016; Jin et al., 2013; Huang, 2001). However, there is a paucity of literature addressing relationship value and frameworks depicting value constructs (Rootman, Tait & Sharp, 2011), and relationship value antecedents on relationship quality and consumer behavioral outcomes (Ulaga & Eggert, 2004).

The primary objectives of this exploratory study are: 1) to investigate the effect of economic value, service value, relational value and social value on relationship quality and 2) to analyse the influence of relationship quality on customer loyalty. The findings of this research will contribute to managerial and theoretical implications. In the aspect of managerial implications, the research findings will provide valuable information to the telecommunication service providers in developing more effective relationship marketing strategies to build better relationship value, relationship quality and customer loyalty. In the theoretical perspective, the social exchange theory (SET) is used to explain and conceptualise relationship marketing paradigms. It will draw the interrelationships between relationship value, relationship quality and customer loyalty.

## 2. Literature Review and Hypotheses Development

### 2.1 Social Exchange Theory (SET)

SET has been used extensively by scholars to analyse the business-to-customer relational exchange. SET is developed to understand the social behavior of humans in economic situations (Homans, 1958). SET investigates the processes of establishing and maintaining reciprocity in social relations, or the mutual gratifications between the parties (Lee, Mohamad and Ramayah, 2010). Individuals evaluate their reward to cost ratio when deciding whether or not to maintain a relationship (Helm, Rolfes and Günter, 2006). Individuals direct their reciprocation efforts toward the source from which benefits are received. The more valuable a response a person receives, the more likely that person will respond with an activity which will further elicit that rewarding activity (Homans, 1961). Relationships between the parties are prolonged as long as they are satisfied with the evaluation of transaction costs and benefits from the exchange. The relationship between firm and customers is a reciprocal process. Hence, in this study SET is applied to investigate consumers' evaluation on their benefits to costs represented by relationship value and relationship quality, and their decision to stay loyal with the service providers.

### 2.2 Relationship Value

Relationship value referring to consumer perceived value on a relationship with a business entity based on cumulative worth of all the tangible and intangible benefits that they derive from it (Hogan, 2001). Wilson and Jantrania (1996) conceptualise three dimensions of relationship value – economic, strategic and behavioural (psychological). Ulaga and Eggert (2005) proposes five key dimensions of relationship value – product benefits, service benefits, know-how benefits, time-to time-to-market benefits and social benefits. Ulaga and Eggert (2006) further describes it as, firstly that the relationship value involves perception where different customers has different values to seek in the same product and secondly, involve judgements between what the products offerings as oppose to the benefits they obtained from the usage. Anderson, Thomson and Wynstra (2000) uses four benefit dimensions of relationship value – economic benefits, technical benefits, service benefits and social benefits. Lapiere (2000) clusters relationship value or benefit into product-related, service-related and relational-related. Ravald and Grönroos (1996) examined the relationship value in two fold, episode benefits and relationship benefits. Despite complex propositions of past researches on real meaning of value including associated costs and benefits within relationship value (Ulaga and Eggert, 2006; Morgan and Hunt, 1994; Terpend, Tyler, Krause and Handfield (2008); Anderson and Narus (1990), it can be implied rather that it is a competing factor (while applying the SET), which many industries relying upon to establish a competitive advantage over their customers.

After reviewing the past literature, this study focuses on economic value, service value, relational value and social value as the key dimensions of relationship value. Hence, this study aim to bridge the research gaps by investigating these four main dimensions of relationship value which were not adequately covered by the past literature, and its relationship with relationship quality and customer loyalty in the context of Malaysian telecommunication industry.

Substantial research has been found on the relationship between relationship value and customer loyalty; suggests that relationship value has significant contributions towards customer loyalty in various industry environment. Badenhorst-Weiss and Tolmay (2016) affirms in their study on the role of relationship value (Tolmay and Venter, 2017) along with the trust, one of the dimension in research quality as identified by Myhal, Kang and Murphy (2008) in South African automotive industry that both are paramount important in retaining the suppliers by customers and eventually strengthen the supply chain and business relationships in growing competitions globally. This valuable relationship is essential in elimination of non-value added activities and further promote value benefits such as improved financial returns, rectification of operational inefficiencies and notably effective business communication (Naude, Ambe, and Kling, 2013) than unpredictable costs (Sun et al., 2014). Relationship value is hence establishes long-term relationships (Yaqub and Hussain, 2013; Chopra and Meindl, 2013) with customers in return it increases the organisational performance. Ulaga and Eggert (2006) examined United States (US) manufacturing companies and the findings suggest that relationship value is an antecedent to relationship quality. In a study conducted in Taiwan's telecommunications services industry, the relationship value has significant mediating role between brand equity (brand and company images) – relational quality and customer loyalty (Chen and Myagmarsuren, 2011). Therefore, the

literature suggests the current research to investigate the role of relationship value towards the customer loyalty within the telecommunication industry settings in Malaysia.

### *2.3 Relationship Quality*

Relationship quality is a consumer's evaluation of the strength of his or her relationship with the service provider (Crosby, Evans and Cowles, 1990). Relationship quality is far more advanced than service quality as a key source of superior organisational performance and competitive advantage. The focus of relationship quality is long-term customer relationships rather than short-term basis transactions.

Researchers have provided multi-dimensions on the concept of relationship quality. Hon and Grunig (1999) proposed the six dimensions of trust, control mutuality, satisfaction, commitment, exchange relationships, and communal relationships. Hennig-Thurau, Gwinner and Gremler (2002), Ulaga and Eggert (2006) and Caceres and Paparoidamis (2007) conceptualises relationship quality as trust, commitment, and satisfaction. Furthermore, Myhal et al. (2008) assert that relationship quality comprises six dimensions of trust, commitment, satisfaction, minimal opportunism, conflict, and communication.

Many studies have suggested the connotation of relationship quality based on trust, satisfaction and commitment (Hon and Grunig, 1999; Caceres and Paparoidamis, 2007; Myhal et al., 2008). This study focuses on trust, satisfaction and commitment as the basis of formation of the measurement items for relationship quality. The synthesis of these three dimensions in relationship quality assists us in analysing the capabilities of telecommunication services to achieve effective customer relationship and loyalty.

### *2.4 Economic Value*

Economic value refers to measurable monetary costs and benefits. The importance to connect value based on benefits-costs evaluation by focusing more on the influencing factors which lead to the consequences of relationships rather than simply to transaction exchanged between firm and customers. Many authors have concluded that customer's economic value involves a trade-off between benefits and costs (Rintamäki, Kuusela, and Mitronen, 2007; Ruiz, Gremler, Washburn, and Carrión, 2008; Ulaga and Chacour, 2001). However, a few authors have provided different dimensions of economic value as they believed it is beyond the evaluation of costs and benefits. According to Holbrook (1999), economic value is a bi-dimensional construct composed of two dimensions – efficiency and quality. Efficiency is closely related to the trade-off of benefits and costs perspective. Efficiency is determined through comparison of what is obtained in an exchange relationship (i.e., products, services, knowledge, and other benefits) with what is given for the purchase (i.e., money, time, effort, and other costs). Quality dimension refers to reactive appreciation of the potential ability of an object or experience to accomplish a goal or to perform a function (Holbrook, 1999). Wilson and Jantrania (1996) cluster economic value into cost reduction, value engineering, investment quality and concurrent engineering.

Ho, Moon, Kim and Yoon (2012) conducted a study on customer perceived value on luxury brands, and they concluded that customers who perceive high symbolic, economic and functional values of the products are more likely to develop a positive relationship with the brands. This implies that better relationship quality strength is build when economic value is strong. Barry and Doney (2011) found that relationship quality is impacted by perceived economic value in the global industrial services context. The positive relationship between economic value and relationship quality is achieved through value generated from transactional benefits and costs, and they further suggested for superior deals at the buyer-seller transaction level to improve relationship quality (Barry and Doney, 2011).

In contrast, Ngelambong, Nor, Omar and Kibal (2016) investigated the interrelationship between relationship value and relationship satisfaction in hospitality brand social networking sites, and they have encountered that economic benefits had no significant effect on relationship satisfaction. Relationship satisfaction is an important components of relationship quality as it represent the strength of relationship between seller and buyer (Kim, Lee and Yoo, 2006). As a result, the following hypothesis is developed:

*H<sub>1</sub>: Economic value has a positive effect on relationship quality.*

### *2.5 Service Value*

Zeithaml (1988) conceptualise service value as consumers weigh their perceptions of service quality against the necessary sacrifices made to acquire the service. The constructs of service quality and sacrifice was further tested by other scholars, to indicate its relationship with service value. A cross-sectional investigation on the conceptualisation of service value was conducted by Cronin, Brady, Brand, Hightower and Shemwell (1997), they claimed that service quality and sacrifice constructs are linked to service value in consumer's purchase intention. The investigation on service value construct is quite apparent in the service industries (Brady and Robertson, 1999). Lapierre (2000) proposed four dimensions of service value – responsiveness, flexibility, reliability, and technical competence. Lapierre (2000) clusters service value into responsiveness, flexibility, reliability, and technical competence. Ponnam and Paul (2016) conducted a study on the Indian retail banking industry, and derived six dimensions for service value. The dimensions are customer intimacy, product leadership, service equity, perceived sacrifice, service quality, and operational excellence.



Lee (2016) found the interrelationship between relationship quality and service value. Kim and Han (2010) conducted a consumer behavioral study in the medical service industry at South Korea, and found that service value had a significant and positive relationship with relationship quality. Kim and Han (2010) further proposed that differentiation strategies and improvement in service reliability contributed to better relationship quality between the service providers and customers. This leads to the second research hypothesis.

*H<sub>2</sub>: Service value has a positive effect on relationship quality.*

### 2.6 Relational Value

Relational value refers to an outcome from a collaborative relationship that enhances the competitive abilities of partners (Lapierre, 2000). Relational value emerged through customers assessment of the benefits and effectiveness of the relationships (Ulaga, 2003). Scholars have provided different perspectives on relational value construct and they classified it as intimacy (Kim and Trail, 2011), image (Lapierre, 2000), reputation (Hansen, Samuelsen and Silseth, 2008), conflict (Rusbult, Farrell, Rogers and Mainous, 1988, Lapierre, 2000), solidarity (Heide and John, 1992; Lapierre, 2000), interdependence (Dash, Bruning and Guin, 2006), length or duration of relationship (Roslin and Melewar, 2004) and trust (Lapierre, 2000).

Past studies have explored the dimensions of relationship value and even tested on relationship quality construct and also linked to consumer behavioural outcomes. Hansen et al. (2008) stated that reputation is an important aspect of value and enhances relationship value. Substantially customer remains loyal to firm with good reputation (Nyugen, Leclerc and LeBlanc, 2013). In the context of business-to-customer relationship, the nature of conflict is unavoidable in any relational exchanges (Anderson and Narus, 1990). Ndubisi and Wah (2005) affirm that conflicts played an important role in building consumer trust and relationship quality. Relationship value is built upon interdependence in relational exchange and it has causal link to the achievement of relationship quality (Dash et al., 2006). A service provider that have achieved a level of customer intimacy with specific customer segment, the value sharing will evolve the relationship to longer term partnership. In a study conducted in Thailand's housing estate industry, relational value has a significant relationship with customer satisfaction (a dimension of relationship quality), and customer loyalty (Sunthorncheewin, Panichpathom, Ngarmyarn and Ratanaprichavej, 2013). Sunthorncheewin et al. (2013) reported that relational value is the most important factor influencing customer satisfaction, compared to other values such as functional, social and emotional. Strong relational values in the aspect of customer intimacy, reputation of the real estate developers and trust are important in consumer decision making when purchasing real estate property. The following hypothesis is formed:

*H<sub>3</sub>: Relational value has a positive effect on relationship quality.*

### 2.7 Social Value

Social value is determined by the utility perceived through customer identification with reference groups (Sheth, Newman and Gross, 1991). Social value is related to affective value and an element that manage customer relationship value in service context (Gale, 1994). Wilson and Jantrania (1996) assert that social value is a component of behavioural dimension which includes social bonding, trust and culture. Sherrouse, Clement and Semmens (2011) and Brown (2013) conceptualise social value based on non-monetary related values such as spiritual, aesthetic and subsistence.

In a study conducted in Spain's retail banking industry, social value has no significant relationship with customer satisfaction (Roig, Guillén, Coll, and Saumell, 2013). Customer satisfaction is a dimension of relationship quality (Myhal et al., 2008; Caceres and Paparoidamis, 2007). However, Roig et al. (2013) reported that social value had a direct positive significant relationship with customer loyalty. Therefore, maintaining a good social reputation by the service provider is important to create and enhance customer's social value.

Prestige brands are related to customer perceived high social value (Ho et al., 2012). Chen and Myagmarsuren (2011) assert that customer prioritised on the telecommunication service providers' brand and company images when engaging them. They found that brand and company images significantly influenced relationship quality, and also existed interrelationship between relationship quality and relationship value. Therefore, in the context of telecommunication services, customer relates brand and company images with the excellent service by the providers. Although Sunthorncheewin et al. (2013) found exist significant relationship between social value and customer satisfaction (a dimension of relationship quality), but the correlation strength is weak. Choo, Moon, Kim and Yoon (2012) investigated customer value in luxury brands in South Korea, and they concluded that high symbolic, social and economic values of luxury brands contributed to positive relationship quality between consumers and suppliers. Considering all the above explanations, the following hypothesis is developed:

*H<sub>4</sub>: Social value has a positive effect on relationship quality.*

### 2.8 Customer Loyalty

Customer loyalty is defined as "a deeply held commitment to re-buy or re-patronize a preferred product or service consistently in the future, thereby causing repetitive same-brand or same brandset purchasing, despite situational influences and marketing efforts have the potential to cause switching behaviour" (Oliver, 1999). Hennig-Thurau et al. (2002) assert that customer loyalty is the "primary goal" of relationship marketing. Bojei and Alwie (2010) reported

that relationship quality positively influenced the customer loyalty was mainly due strong commitment given by the service provider to the customers. Ruswanti and Lectari (2016) also indicated significant positive relationship between relationship quality and customer loyalty. The service providers have delivered good services which met customer's expectation and goal, and satisfying, subsequently leads to good relational quality and customer loyalty. Jin et al. (2012) conducted a study in the full-service restaurant in US, and they found that relationship quality positively influenced customer loyalty. Jin et al. (2012) further assert that trust and satisfaction are the important dimensions of relationship quality enabling emotional attachment and customer loyalty.

In contrast, Chen and Myagmarsuren (2011) found that direct relationship does not exist between relationship quality and customer loyalty in the telecommunication services. They concluded that relationship quality affect customer loyalty was mediated by relationship value. Hence, the following hypothesis is developed:

*H<sub>5</sub>: Relationship quality has a positive effect on customer loyalty.*

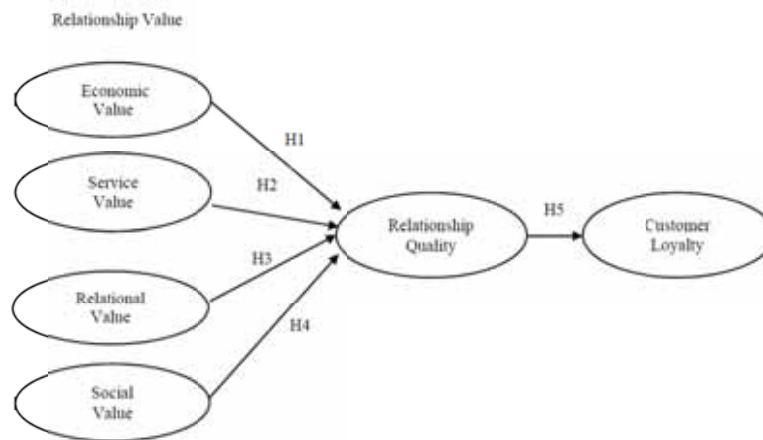


Figure 1. Conceptual framework

### 3. Research Methodology

#### 3.1 Research Design, Sampling and Measurement

The quantitative research emphasizes on the production of precise and generalizable statistical findings (Rubin and Babbie, 2009). Quantitative method involved large number of samples that need to be studied for the purpose of testing hypotheses, for example, “how many” people have “similar characteristics and views” (Pellissier, 2007). Quantitative approach was selected to facilitate the requirements of this study where its goals to be objective, to effectively test the hypotheses and use the statistical models to explain what was observed. Large sample size of consumers from the industry, for example over 300, is required to measure consumers' behaviour in order to yield meaningful responses and precision (Perner, 2011). This paper is based on data collected from a survey on the existing customers of local telecommunication service providers, namely Maxis, Digi and Celcom, in Selangor, Malaysia. A sample size of 350 was determined and non-probability convenience sampling method was adopted for this study. Self-administered questionnaires were distributed to the respondents who present at the selected outlets of Maxis, Digi and Celcom.

Measurement is defined as “assignment of numbers to observations according to some set of rules” (Neelankavil, 2007). Appropriate rating scale is required to convert respondent's views, feelings, opinions and other subjective characteristics onto a continuum of intensity. Through the collection of quantifiable data, data analysis can be performed. According to Linstone and Turoff (2011), the survey instrument usually adopted an interval scale. Interval scales are often used to measure attitude, perceptions, satisfaction level and other related aspects (Brace, 2008). Therefore, in this study, interval scale was adopted because of its suitability for quantitative study through survey that measures range of attitudes and opinions of the respondents (Cavana, Delahaye and Sekaran, 2001). Likert scale of six-points have been frequently used by most studies (Richardson, Moore and Gwernan-Jones, 2015). Through interval scale, 27 items are measured using six-point Likert scales based on agreement response choices with 1 representing ‘strongly disagree’ to the range of 6 representing ‘strongly agree’.

SPSS software is widely used for quantitative data analysis (Greasley, 2008). The Statistical Package for Social Sciences (SPSS) version 22 was used to perform descriptive analysis, validity and reliability analysis. Followed by, SPSS AMOS version 21 was used to perform the Structural Equation Modelling (SEM) analysis to test the hypotheses. SEM has the function of analysing multiple regression models simultaneously (Awang, 2014), and it could facilitate the required analysis to achieve the objectives of this study.

#### 3.2 Reliability and Validity Assessment

The pilot study results indicated the factor loading for all the 27 proposed items is above 0.3 and thereby will be retained (Hair, Black, Babin and Anderson, 2010). The Confirmatory Factor Analysis (CFA) for each item in the construct,

reliability test, composite reliability (CR) and average variance extracted (AVE) results are shown in Table 1. The reliability assessment for the measurement model is conducted based on the internal reliability and CR. Internal reliability is achieved when the Cronbach's Alpha value is greater than 0.7 which indicated a high level of internal consistency in the data (Pallant, 2007). For this study, the Cronbach's Alpha values indicated as 0.927 (Economic Value), 0.853 (Service Value), 0.902 (Relational Value), 0.834 (Social Value), 0.899 (Relationship Quality) and 0.869 (Customer Loyalty). CR of 0.7 or higher is considered good (Malhotra and Dash, 2011; Nunnally and Bernstein, 1994). Each dimensions CR are between 0.841 and 0.927, higher than the threshold level of 0.7.

Validity refers to the ability of instruments to measure what it supposed to be measured for a construct. The convergent validity is achieved through computation of the AVE for every construct and the acceptable value of AVE is 0.5 or higher (Fornell and Larcker, 1981). In this study, each dimensions AVE are between 0.570 and 0.899, higher than the required standard of 0.5. All AVE above 0.5 which indicates significant degrees. Overall, there is a significant confidence of the survey instrument quality based on the reliability and validity analyses.

Table 1. CFA, Cronbach's Alpha, CR and AVE results for the measurement model

Construct	Item	Statement	Factor Loading	Cronbach's Alpha	CR	AVE
Economic Value	V1	Satisfied with the price offered by my service provider.	.831	.927	0.927	0.899
	V2	Value for money service packages.	.895			
	V3	Frequent attractive promotions provided to customers.	.903			
	V4	Effective functional value of the services.	.841			
	V5	Overall, more benefits than costs received from the services.	.763			
Service Value	C1	Excellent customer service provided.	.673	.853	0.856	0.679
	C2	Services offered meet my expectations.	.750			
	C3	Flexible service packages that meet my needs.	.755			
	C4	Efficient in solving customer enquiries/ problems.	.816			
	C5	My service provider fulfils its obligations to customer.	.683			
Relational Value	T1	Respect and take into consideration of customer's feedback.	.762	.902	0.905	0.707
	T2	Good involvement of customers in social responsibility activities.	.870			
	T3	Prioritised on good relationship with customers.	.931			
	T4	Good involvement of customers in service innovation/ development.	.789			
Social Value	S1	Improved my social status.	.709	.834	0.841	0.570
	S2	Improved my lifestyle.	.806			
	S3	Improved my interpersonal relationships.	.811			
	S4	Improved my general knowledge.	.686			
Relationship Quality	Q1	Overall, satisfied with my service provider.	.744	.899	0.894	0.787
	Q2	High level of trust towards my service provider.	.786			
	Q3	Good commitment given by my service provider to customer.	.863			
	Q4	Higher satisfaction of my service provider than other service provider(s).	.891			
	Q5	Provided timely and trustworthy information to customer.	.661			
Customer Loyalty	L1	Maintained loyal to current service provider.	.810	.869	0.870	0.626
	L2	Preferred my service provider than other service providers.	.786			
	L3	Intention to purchase extra other service or package from my current service provider.	.797			
	L4	Intention to recommend my current service provider to others.	.770			

## 4. Results

### 4.1 Demographic Profile of the Respondents

From the total of 350 respondents, majority respondents are female (58.3%), followed by male (41.7%). As for the respondents' monthly income, 5.1 percent earned less than RM1500, 13.7 percent of the respondents have an income between RM1500– RM3000. Furthermore, 42.3 percent of the respondents have an income between

RM3000-RM6000 and 30.9 percent of the respondents belong to the income group of RM6000-RM10000. Respondents with an income above RM 10000 comprises 8.0 percent. Majority respondents are Chinese respondents (48.6%), followed by Malay (30%), Indian (14.9%) and others (6.6%). As for the respondents' age, 8.3 percent belong to the age group of 18-20, followed by 24.9 percent under the age group between 21 -38. Majority of 50.3 percent of the respondents under the age group of 39-49, and 16.6 percent belong to age group of 50 and above.

4.2 Model Compatibility Testing

SEM was applied to estimate the relationships between economic value, service value, relational value and social value, relationship quality, and customer loyalty using the maximum likelihood procedure. The research model has achieved a good fit as shown in Table 2. The *Chi-Square* value is 693.36 and according to Barrett (2007), chi square probability value greater than 0.05 indicates acceptable model fit. The ratio of  $\chi^2/df$  was 2.215 which is lower than the value 3.0, as suggested by Byrne (2001). The absolute index with RMSEA of 0.059, achieved lower than 0.8 (Browne and Cudeck 1993). Incremental fit indices were greater than 0.9, with IFI of 0.935, CFI of 0.935 and TLI of 0.927.

Table 2. Goodness of Fit

Index	Level of Acceptance	Result	Model Evaluation
Chi-square	P>0.05	693.36	Good
Chisq/df	Chi Square / df <3.0	2.215	Good
RMSEA	RMSEA < 0.08	0.059	Good
IFI	IFI > 0.9	0.935	Good
CFI	CFI > 0.9	0.935	Good
TLI	TLI > 0.9	0.927	Good

The normality assessment was performed and shown that the data is normally distributed with value of skewness between -1.0 and 1.0, and kurtosis of between -3.0 and 3.0. Finally, the estimated path coefficients were derived and the research hypotheses were examined.

4.3 Model Causality Testing

The final structural model is shown in Figure 2.

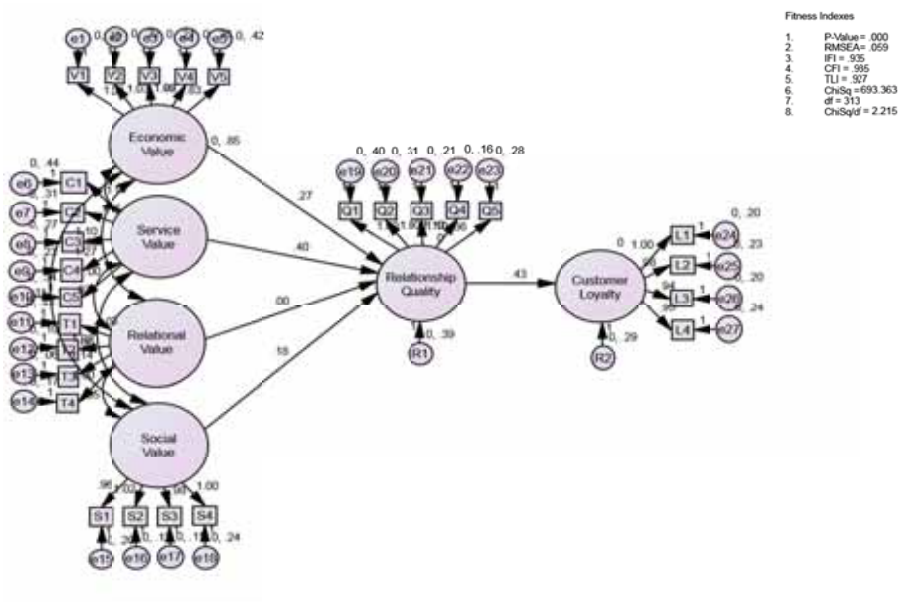


Figure 2. Final Structural Model

The regression weights and probability value which indicates its significance is shown in Table 3. The findings indicated that economic value has significant positive effect (0.266) on relationship quality and H<sub>1</sub> is accepted. The results have supported the previous study by Barry and Doney (2011). H<sub>2</sub> is accepted and service value has significant effect on relationship quality (0.397). In fact, the correlation coefficient value is the strong for the relationship between service value and relationship quality. Consumers believed that the service providers have performed well in the aspect of providing service quality and excellence. The findings obtained are consistent with the previous study conducted by Kim and Han (2010).

The regression coefficient of the relationship between relational value and relationship quality is not significant (-0.001). As a result, H<sub>3</sub> is rejected. The regression coefficient of the relationship between social value and relationship

quality is significant (0.181) and  $H_4$  is accepted. Subsequently, relationship quality had positive effect (0.431) on customer loyalty, and  $H_5$  is accepted. The results have supported the previous study by Ruswanti and Lectari (2016), Bojei and Alwie (2010), and Jin et al. (2012). The correlation coefficient value is the strongest for the relationship between relationship quality and customer loyalty.

Table 3. Regression Weights and the Probability Value which Indicates its Significance

Paths			Estimate	S.E.	C.R.	P	Result
Relationship quality	<--	Economic Value	.266	.046	5.740	***	Supported
Relationship quality	<--	Service Value	.397	.081	4.872	***	Supported
Relationship quality	<--	Relational Value	-.001	.073	-0,015	.988	Rejected
Relationship quality	<--	Social Value	.181	.092	1.975	.048	Supported
Customer Loyalty	<--	Relationship quality	.431	.051	8.422	***	Supported

## 5. Discussion and Conclusion

The application of SET in this study to investigate the processes of establishing and maintaining reciprocity in social relations between firm and customer has been affirmed. In the process of establishing reciprocity through consumers' evaluation on their benefits and costs, relationship value dimensions of economic value, service value and social value have been found as important antecedents to achieve relationship quality. The findings concluded that consumers good strength of relationship with their service providers. Moreover, customers maintained reciprocity through their loyalty towards the telecommunication service providers.

The findings also shown that economic value has significant effect on relationship quality. We can conclude that customers are generally satisfied with their current service providers in providing value for money packages, functional value and pricing of the services. Often consumers relate sales promotional benefits with the economic value they received. Hence, attractive sales promotional activities, such as discounts on packaged service, loyalty programme and free premium items, should be carried out more intensively to build consumer loyalty. In the price sensitivity consumer market in Malaysia, frequent reward and promotional offers would increase consumers' consumption level and loyalty. The service providers should be more focused in their segment-level strategies by offering different service packages to customers of different segments and value. Customers clearly prefer quality services with fair prices in the competitive market in order to meet their satisfaction and expectations.

The study also found that service value construct has strong correlation and positively correlated to relationship quality. Consumers acknowledged the excellent service provided by the firms. In view of stiff competitions between the local telecommunication service providers, significant and continuous improvement on service delivery are required through leveraging on social media to provide better customers' enquiries or feedback. Consumers perceived that relational value is not adequately emphasized by the service providers as indicated by the hypothesis  $H_3$  is rejected. The service providers are lacking in customer involvement in service innovation or development and other social activities. The intense competitions and organisational capabilities are the main drivers for innovation. According to Grönroos (2017b), customer should play the role of value creator through the platform of co-creation involving interactive, collaborative and dialogical process, between the service provider and customer. In addition, service innovation should take into account of consumers' changing needs and preferences. The findings revealed that for long-term relationship success, relationship quality should focus on increasing relational value through better engagement with customers in the aspect of service improvement based on customers' feedback, better involvement of customers in social responsibilities activities and prioritising on loyal customers to enhance on service innovation or development. Shared value between the parties could be obtained through higher relational value. Customers closely relate brand of the service provider and with their social value. Brand enhancement initiatives through more effective brand investment strategies could provide maximum exposure of the brand.

This study is confined to Malaysian telecommunication industry, and focused on the important four dimensions of relationship value - economic value, service value, relational value and social value. Future studies should explore on other industries and other dimensions of relationship value, such as from the strategic perspective. Future research can also be more specific in their samples by targeting certain segment of consumers based on gender, ethnicity, generation and geographical location to provide more in-depth understanding on the purchasing behaviour of this specific group or segment of consumers. The dependent variables could be extended to other consumer behavioural outcomes, such as consumer satisfaction and consumer repurchase intention.

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## *Pamali*, Bajo's Local Wisdom in the Conservation of Marine Resources

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Received: August 26, 2017

Accepted: October 16, 2017

Online Published: November 28, 2017

doi:10.5539/ass.v13n12p63

URL: <https://doi.org/10.5539/ass.v13n12p63>

### Abstract

The purpose of this study is to examine and analyze the tradition of pamali (taboo/tobo) as one of local wisdom of Bajo tribe in the conservation of marine resources. This research was conducted in Bungin Permai Village, South Konawe District, Southeast Sulawesi. Data collection techniques were conducted through in-depth interviews, involved observations, document studies and focused discussions. Data analysis is done through data reduction, data presentation and conclusion. The results show that pamali or abstinence is one of local wisdom of Bajo tribe in the conservation of marine resources born from their life experiences in interacting with the sea, with the same (Bajo tribe) and bagai (people outside Bajo tribe), and their relationship with Mbo (God) the ruler of the sea. Pamali arranges matters relating to the survival of ecosystems and marine biota, such as pamali of catching fish or collecting seafood around the coral reefs, in pasi and pamali of catching marine animals seen as the embodiment of Mbo. Pamali also deals with the safety of individuals and Bajo society generally, because the Bajo tribe believes in pamali as karma law, if it is violated will befall the person who violates it or its family and its offspring anytime and anywhere. The understanding of pamali gave birth to the concept of self-conscious behavior in the management of marine resources called *empe diri* (empat diri) that is Self-Awareness, Self-Endurance, Self-Conception and Self-Confidence.

**Keywords:** local wisdom, *pamali*, conservation of marine resources, and Bajo tribe.

### 1. Preliminary

The Bajo tribe has different names, namely in West Indonesia as the Sea people or Sea tribe. In the eastern part of Indonesia, these groups are called Bajo, Bajau, or Sama-Bajo, while in some Asian countries such as Malaysia, the Philippines calls Bajau. Kazufumi and Lopian (1997) refer to Bajo as Sea Tribe with high mobility rate, living in coastal areas or above sea waters with livelihood activities as traditional fishermen. Although the Bajo tribe has different names, but from the aspect of cultural characteristics, this ethnic is a group of coastal communities or maritime culture. Its maritime characteristics can be identified primarily in their model of environmental management of settlements over marine waters, livelihoods as traditional fishermen, knowledge systems, technology, economic systems and social organization of the Bajo tribe centered on the utilization of marine and coastal resources.

The characteristics of Bajo tribe, clearly implicit in the local wisdom that embodied in their cosmology that "Mbo kita ne lino baka isi-isina, kita neje manusiana mamikker iyya batingga kole'ta mangelola iyya" (God has given this world to all its contents to humans, so we have to think and manage it well and wisely). The Bajo tribe interprets the sea as life. The sea is a garden as well as their yard. They believe that their ancestors came from the sea, live in the sea, and as Mbombongana lao (ruler of the sea) who can provide sustenance, goodness, health, and protect people from disaster. In the view of the Bajo tribe, this philosophy implies that the Bajo People will never experience hunger or poverty because the seas are infinite with all the potential and wealth of resources in it is the source of life.

The study of Bajo people and their local wisdom has been done by several researchers, such as Saat (2003) stated that the Bajo tribe in Malaysia, the Philippines and Indonesia is relatively the same that is always viewed as a tribe or society that builds its civilization base on the sea or coastal, with a low degree of civilization when compared to other tribes. Saat and Mansur (2016) also conducted a study of issues in diaspora of *Sama Dilaut* and its consequences in Sabah Malaysia. The results show that although the Bajo or Sama-Bajau has adopted the culture of urban society, it is still categorized as the *Sama Dilaut* group. Meanwhile, Ismail et al (2015) study shows that Bajo people are maritime communities living in coastal areas.

In the Indonesian context, the study of Bajo People was done by Saidi (2001) that the Bajo people interpret the sea stretching unlimitedly on the surface of the earth, as a space to engage in activity, as well as space to perform the process of inheritance of values to the next generation. The findings are reinforced by Bahtiar and Basri (2011) that the

Bajo people view the ocean as a source of life, which plays an important role in their economy.

Another study was also conducted by Basri (2010) which shows that the Bajo People have a potent set of local cultures as a catalyst for the empowerment of the Bajo community, and has a set of traditional knowledge in eco-friendly fishing such as rompoh, pempeso and bhala. Meanwhile, Suryanegara et al (2015) stated that the Bajo people have local wisdom in managing marine resources held firm by the people. They have a rule in terms of fishing, one of which they always choose a fish that is mature. Similarly to the findings of Baskara and Astuti (2011), that Bajo People are known as sea tribes because they live in the sea, and the sea is their primary source of life. According to Bajo People, the sea should not be damaged because it is their brother, so in the view of the Bajo that the sea will take care of them.

Meanwhile, Indrawasih and Antariksa (2003) study results show that Bajo people have local wisdom to preserve their environment, such as corals, mangroves and other marine resources. The wood they grab from the branches that have dried, because they realize mangrove is the main of resources. They will soon stop exploiting resources in certain areas and move to other places if they feel the resources are getting wild and diminishing, thus allowing resources to multiply. In line with these findings, Bahtiar (2012) states that the Bajo people have local wisdom in the conservation of marine resources called ongko, namely the arrangement of place or location of fishing based on the habit of a person or group of people. With this system the Bajo people not mutually seize the catch location. While Artanto (2017) states that the Bajo people have local wisdom in the preservation of coastal and sea called bapongka, which is a group of sea fishing activities for several weeks or monthly by using a traditional boat called leppa or sopek. According to Artanto (2017) bapongka is one model of conserving the marine environment in a sustainable manner. All the results clarify that the Bajo people have a set of local wisdom utilized in conserving marine resources, one of which is the Bajo people of Pamali who settled in Bungin Village of South Konawe, Southeast Sulawesi.

## 2. Research Methods

This research was conducted in Bungin Village of South Konawe Regency, Southeast Sulawesi, Indonesia which was held for three months. The main informants in this study were traditional elders, youth leaders, and ordinary citizens determined purposively. Data collection techniques were conducted through: (1) observations involved in aspects of local wisdom of Bajo people related to marine and coastal resource management, (2) in-depth interviews to Bajo figures, religious leaders, traditional leaders, youth leaders and other Bajo people about ideas, experiences, knowledge of informants about various matters related to local wisdom, Bajo tribe's activities, and their relationship with the outside world, (3) conducting document studies, especially documents related to Bajo culture.

Data analysis was done descriptively-qualitatively, through four steps, namely (1) arranging the units of all data collected from the interview, observation, literature study and focus group discussion divided one by one, collected according to its class, then done data reduction in order to eliminate irrelevant data, create abstractions and arrange data units; (2) categorize data so that the process of categorization and data grouping can be better; (3) arranging relationships between categories, comparing one with other data, and interpreting the meaning of each relationship data; and (4) provide interpretation and relationships between categories of data that have been grouped so that can be found meaning and conclusion. In the research data collection activities, used several tools such as data cards and interview guides. The data cards are used for recording, categorizing, and classifying data, while interview guides are used as referrers during interviews. Another tool used is a photo camera or video camera to record observations and recorders to record the results of the interview.

## 3. Result and Discussion

The Bajo people pay attention seriously to the marine environment, because the ocean is the pulse of their economy. The sea is seen as a source of life and livelihood of Bajo people, who play a role in helping to improve their economic level. The sea as a place to earn a living is seen as a sacred place, so it should not be arbitrary. Therefore, Bajo people conserve marine resources through customary rules of pamali and environmental care actions such as planting mangroves in coastal areas. The Bajo ancestors appreciate it in the expression of philosophy "kadampaannu kampo maiga-iga, pugai allou mabunda ana'umputa ". (Love the marine environment for the future of our children and grandchildren). The expression is a reflection of the high sense of belonging Bajo people to the sea, so they always maintain and preserve the precious source of life.

In running the sea activities there are also some restrictions or pamali that must be considered and not be violated. Pamali is related to the survival of ecosystems and marine biota, and there is also related to the safety of individuals and Bajo society in general. The prohibition relating to the survival of ecosystems and marine biota, such as not catching fish or taking other marine products on corals, in pasi (sandy ground in the sea in the form of delta) because these places are believed to be the residence of Mbo, God Ruler of the sea. Prohibition of catching marine animals that are considered to be the embodiment of Mbo, such as octopus fish, bawal fish, kulintang, kunyu boe (a kind of turtle), mermaid like dolphins and sharks. The existence of a ban on catching the sea animals, in addition to being regarded as sea-like incarnation animals, there are also marine animals such as bawal fish, which according to the Bajo people that the fish in the past have merit to save their ancestors when having an accident at sea. Therefore, the Bajo people regard the animal as a human friend.

Therefore, Bajo people in Bungin also develop equipment systems that pay attention to coral reef conservation, namely by making a pempeso fish traps or other marine animals made from woven bamboo or rattan. Pempeso is usually

dissolved in the seabed near the reef or around the reef called the fish house as well as Mbo house. However, the Pempeso system does not damage the coral reef, because the Bajo people put it by considering the safety aspect of the pempeso when lifted from the seabed. In one part of the pempeso is usually stored stone or iron to facilitate sinking in the seabed. Pempeso is also tied with a long rope and moored in a boat or tree and then stored for a few hours or also left overnight and drawn the next day. In addition, the Bajo people also use *rompoh* (rumpon) made from bamboo and coconut leaves. The Bamboo is formed to resemble a raft, on the bottom and sides of rompoh hung coconut leaves, so the fish gathered in that place. The Bajo people put up a net around the rompoh. Besides rompoh, the Bajo people also use *bhalla* (traditional cage) to catch fish.

According to the traditional view of the Bajo people this arresting technique is seen as not disturbing the convenience of Mbo as the provider of sustenance and the sea guard. For that, the Bajo people always maintain the attitude and actions that can cause Mbo wrath to them. One of the implementation is that they are strongly believes with pamali. The Bajo people believe that they should not damage the pamali place or violated the pamali. If they do it, they will get punishment or curse from Mbo, a serious illness or death, drown in the sea, strangled, and so on.

In a story it is told that in Bungin village there was once a Bajo man who still gagga (strong and healthy) died at the time of ngarua (catching fish during the day) with nubba (by whipping water with a stick or paddle). When the man was beating water with a stick, he suddenly fell from his boat. According to the society, the young matai (died) killed by the spirits for violating pamali. He was too hard to hit the water with a stick and did not recognize the stench around the rock where he caught fish.

The Bajo people never investigate the cause of a person's death, especially when someone dies while catching a fish. For the Bajo people, it is clearly a sign of the spirit's actions and a warning to others. According to the Bajo people one's death is an act of Satan, but if *Sama* is not violated pamali will get protection from Mbo. For Bajo people is a real and absolute reality. The people who make mistakes or do not obey pamali will be punished, both in quick and long time. If the karma or punishment does not occur directly to the person concerned, then the karma or punishment will befall to the family, children, grandchildren or its derivatives. Therefore, the Bajo People must apply humanist in managing the marine resources that exist around them.

The doctrine to apply humanist to fellow creatures, poured in the form of pamali about the prohibition of killing pigs or deer who come down in the sea. In the Bajo People conception, Mbo has a good relationship with the landlord, so they must refrain from killing pigs, deer or other land animals that descend into the sea. Because according to them may be the animal is the embodiment of Mbo ma on land (landlord). This view, in line with the results of Zacot (2008) study indicating that the Bajo people not only have pamali in the sea but also have some taboos related to life on land. According to Zakot, the pamali is inherently influential with the life of the Bajo people as a whole.

The concept of *pamali* in Bajo society if analyzed scientifically is actually loaded with meaning. These places are places that can support the sustainability and balance of marine ecology and the future of mankind. Similarly, marine animals in traditional thought of Bajo people are Mbo's incarnation animals so become pamali, is a marine species protected by the state. Gaaras (coral reef) is one of the places which the Bajo belief that Mbo lives in that place, and every place in Mbo has many fish and other types of marine life, because Mbo is the owner. The Bajo people should not catch fish in this place and not destroy it, because it can get wrath from Mbo.

The Bajo's view of coral reef function or in Bajo society is called garas has a very close coherence with the study of marine science that coral reef is a marine resource that is very useful for the benefit of mankind. In coral reef marine science has the following functions (1) as coastal protection, as well as retaining the waves in order to avoid abrasion in the shore and reduce erosion; (2) coral reefs can reduce the impact of global warming; (3) to support the life of various types of living things that exist in the vicinity. Coral reefs provide shelter, feeding, and breeding for a variety of marine biota, as a gathering place for fish and marine organisms, because coral reefs own and store food needed by fish and other marine organisms; (4) as biodiversity; areas that have many coral reefs also have many marine organisms; (5) a lime deposition reservoir containing carbon; (6) coral reefs also function to reduce the carbon released into the atmosphere so as to reduce the impact of ozone damage and global warming; (7) as a tourist attraction, (<https://alamendah.org>/accessed on August 19, 2017).

Understanding and interpreting the functions of pamali in Bajo society, it can be said that Bajo tribe actually long before the discovery of conventional conservation ideas (modern), Bajo society have conservation ideas based on their local culture. Pamali culture is very adhered by the Bajo people is a form of high concern for the sustainability of the marine environment, especially the environment around the coral reef as a buffer underwater ecosystems. In addition, the habit of Bajo people to plant *tongke* (mangrove) is one form of mitigasi tactic, in the form of hurricanes or large waves. According to the Bajo people, if around their village there are mangroves, then the wind will not directly hit their house, but will first be blocked by mangrove trees, so that the wind power can be reduced. Thus they will be spared from the wind like tornado.

The Bajo local wisdom in marine conservation is strengthening the findings of Taena et al (2016) and Basri et al (2017). According to Taena et al (2016) states that local wisdom can be found in any community in the world, while Basri et al (2017) states that each community group has its own traditional culture and local wisdom that characterizes the uniqueness of the community. The Bajo local wisdom is embodied in a system of religious beliefs and emotional

bonds in their transcendental relationship with Mbo Ma Dilao's power, conception and expression of life and the nature of life, purpose, orientation, knowledge and the framework of their interpretation of the sea world, cultured sea (Basri, et al, 2011).

Understanding and appreciation of Pamali gave birth to the concept of self-conscious behavior in the management of marine resources called self *empe* (*empat-diri*) namely, *tahan diri* (self-endurance), *ngatonang diri* (self-awareness), *angga' diri* (self-conception), and *matappa diri* (self-confidence). Self-endurance, contain meaning in seeking or trying not to be greedy, can not justify any means, furthermore to damage the marine environment. The sea must always be preserved and nurtured, as the primary source of life, for the future of their children and grandchildren. Bajo people believe that they are the chosen people who have been destined to inhabit and guard the sea. They regard themselves as descendants of the God of the sea, who are entitled to design and determine their own course of life at the sea. Therefore they can not be separated by the sea. The sea belongs to those who have been awarded by God to be managed by the Bajo people.

Self-awareness means that the source of sustenance is Mbo (God of the Sea), then in searching should not solely rely on the luck factor, but must be followed by a prayer to Mbo God of the sea ruler. Bajo people realize that their ability in trying is so limited that the final result is entirely back to Mbo. For that, all forms of pamali that might make Mbo wrath to them are always avoided. Even to attract the sympathetic of Mbo to always bless them in searching or working at sea, since the making and use of new boats and at every time go to the sea is always preceded by ceremonies and rituals, one of which is the ritual *mangujuyya leppa* (boat blessing) and *maduai loa* (respect for the sea). According to the Bajo People, the wisdom of ceremony is to get bless from Mbo for a new boat. Thus, between the boat and sea can unite and many get sustenance, the boat is durable or not quickly damaged and protected from danger. For the boat owners will get a lot of seafood so that never suffer from lack of food or poverty.

Self-conception implies that the Bajo are the chosen people who have been destined by God to inhabit the sea. They are proud to call themselves as sea people and they group themselves into *sama* (the group of Bajo people) and *bagai* (foreigners or people outside Bajo). They believe that they are descendants of the God of the Sea, who are entitled to determine and design the direction of life at sea. Nothing can separate them with the sea except death. Bajo people have naturally united themselves with marine life in harmony with their natural resources and become part of the sea in all its aspects. The Bajo people recognize the sea as knowing themselves, love it, wrestle deep into it and blend with their true life. They feel the serenity and peace in the cradle of the waves of the sea.

Self-confidence means that in seeking or trying they believe in the abilities they possess. Individual ability and collective awareness are the capital that can build and develop their economies. Nothing *bagai* will pay attention to their lives, except the fellow Bajos. They must live out of their own efforts and their group. Individually, the average Bajo is a diligent worker tirelessly, so whatever they do is always completed, regardless of time. The Bajo people have personality that is able to utilize the potential of natural resources in the surrounding as a tool that can fulfill the needs of his life. The various crafts as a mirror how high knowledge and skills they have is one form of their creativity results. In collective life, the spirit of "*kebajoan*" seems so strong. They always work together to help each other to relieve the burden of life with the principles of *situlu-tulu* (helping each other), *sikaada* (mutual acceptance), and *sippatappa* (mutual trust). The above description shows that the Bajo community has a set of local wisdom stored in its social and cultural system (Basri, et al, 2017).

Observing the knowledge of Bajo people in the management of marine resources as described above then linked with the Bajo's traditional view that the ocean is an endless resources, it seems that their conception is not entirely wrong, not even at all. Because, the Bajo people have a set of rules that conceptualized pamali that they always obey. Indonesia has a coastline of approximately 100,000 km, is the second longest beach line in the world after Canada with the world's most complete biodiversity (<http://www.antaraneews.com>, accessed 19/9/2017), if managed wisely with using environmentally friendly technology as exemplified by the ancestors of the Bajo people, of course the marine resources will be preserved sustainability and will be functional for human life.

#### 4. Conclusion

*Pamali* is a banned which is always upheld by the Bajo people in carrying out the sea activities because it is believed to be true, if violated will bring *mudharat* (badness) for those who do not heed it. In the life of Bajo, pamali serves as a controller for individuals and society collectively in order not to be bad behaviour, not to do acts that damage the environment, not to do acts that violate Mbo's command, not violate ethics norms. Pamali arranges matters relating to the survival of ecosystems and marine biota, such as pamali catching fish or harvesting seafood around the coral reefs, in *pasi*, and catching marine animals that are seen as the embodiment of Mbo. Pamali also deals with the safety of individuals and Bajo society in general, because the Bajo people believe in pamali as karma law, if it is violated its karma will happen to those who violate it or its family and offspring anytime and anywhere.

Understanding of *pamali* gave birth to the concept of self-conscious behavior in the management of marine resources called the *empe diri* (*empat diri*) that is Self-Awareness, Self-Defense, Self-Conception and Self-Confidence. Self-Awareness contains meaning of Bajo people realize that they have many weaknesses so that always rely on Mbo. Self-Defense means not to allow any strategy to use marine resources. Self-Conception means Bajo people are proud to be sea people, while Self-Confidence contains the meaning of Bajo People believe in the socio-cultural system, the

original knowledge and skill system that they have as the main capital in navigating life at sea.

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# The First Lady and the National Image: Focusing on the Media Report from China and South Korea about the First Lady of China and North Korea

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Received: September 3, 2017

Accepted: October 16, 2017

Online Published: November 28, 2017

doi:10.5539/ass.v13n12p68

URL: <https://doi.org/10.5539/ass.v13n12p68>

## Abstract

The formation of the national image is a part of the public diplomacy which presents the nation's overall power and the influence of the nation. This research, with the topic of "The First Lady and the Nation's image", analyzes the press reports of South Korea and China on the new First Ladies of China and North Korea, Li Sol-ju and Peng Liyuan, to review the national images of the two nations. The research findings illustrate the national images of two countries: China has an image of a political power in developing process. Also, North Korea, although it is not a powerful country in international diplomacy, appears to play its important part in the international stage with an image of a conservative nation. Furthermore, with the appearance of the First Lady, China gained more recognition and attracted greater attention in the international community, and North Korea, on the other hand, also receives worldwide interests, but still has a mysterious and curious image. It was clear that both countries are willing to improve their national images at home and abroad by their First Ladies.

**Keywords:** First lady, National image, Peng Liyuan, Li Sol-ju

## 1. Introduction

The formation of a national image is considered to be an important part of a country's "soft power", which fully embodies the comprehensive strength and influence of a country. Both China and North Korea are considered as countries with great influences not only in East Asia but also throughout the world. The national images of China and North Korea embody the comprehensive strength and influence of such countries, moreover reflects the attitude of other nations toward China and North Korea.

Political succession occurred recently in China and North Korea. The new governments have added layers of new colors on the national images for the new era. Press around the world have reported all perspectives of the renewed China and North Korea. Considering the continuous growth of China and North Korea and the changes of their reputations on the international stage, newly formed national images will again frame the attitudes toward these two countries.

The image of a country can be manifested from different aspects. When the country publicizes its image, it also chooses different subjects. Among those, the media coverage of the First Lady is a unique angle to understand the image of a country. The First Lady's influence on the national image has been an important tool and tradition in western public diplomacy which would be a great attempt for China and North Korea as well. 1 (Jin Jiong, 2012)

There are many studies on the national images of China and North Korea. Meanwhile, most of the studies on the influence of presidential spouse on the nation and framing the national image have centered on western countries. Therefore, this report will be an attempt to study the influence of the First Ladies of China and North Korea. Due to the writer's background, the research is based on a host of articles from Chinese and South Korean press. Furthermore, this report will contrast the media's depiction of the First Ladies of China and North Korea along with their influences on framing the national images of their countries.

## 2. Research Methodology

This report is based on quantitative analysis on the First Ladies of China and North Korea according to the reports from "People's Daily" and "Chosun Ilbo Chinese Web".

### 2.1 Selection of Newspaper

Considering the influence and comprehensive competitiveness of the newspaper, one of the most influential media in China is the "People's Daily", and that of South Korea would be the "Chosun Ilbo". Thus, the research on Peng Liyuan, the First Lady of China, and Li Sol-ju, the First Lady of North Korea, is based on "People's Daily" and "Chosun Ilbo

<sup>1</sup> Jin Jing, *Public Diplomacy and research of the Chinese National Image*, Yanbian Universtiy, Master's Thesis, 2015-05-25

Chinese Web”. For “People’s Daily”, reports between January 1<sup>st</sup> and May 31<sup>st</sup> of 2013 are examined, while for “Chosun Ilbo Chinese Web” reports prior to May 31<sup>st</sup> of 2013 are examined.

## 2.2 Period

Plenty of resources about the First Ladies of China and North Korea can be found on the “People’s Daily”, however, due to the time constraint and writer’s ability, the research has been between January 1<sup>st</sup> and May 31<sup>st</sup> of 2013. Meanwhile, South Korean press has only limited amount of resources about this topic that reports examination from “Chosun Ilbo Chinese Web” went prior to May 31<sup>st</sup> of 2013.

## 2.3 Analysis on Different Sections

Through searching the word “Peng Liyuan” from the “People’s Daily” reports between January 1<sup>st</sup> and May 2<sup>nd</sup> of 2013, total of 2052 of reports are found. With the word “Li Sol-ju”, total of 358 reports are found. Similarly, by searching “Peng Liyuan” and “Li Sol-ju” on “Chosun Ilbo Chinese Web” reports, total of 15 reports and 14 reports are found, respectively.

## 2.4 Category Setting

### 2.4.1 Content Orientation

Reports cover politics, economy, culture, and social aspects. Political reports focus on policies and related exercises of political life, diplomacy, international relations and national defense; Economic reports focus on the nation’s economic conditions and related exercises with polices; Cultural reports focus on education, sports, health, technology and medicine along with related exercises; Social reports focus on social phenomena, social dynamics, and social events.

### 2.4.2 Report Tendency

Report tendency was separated into positive, neutral, and negative. The yard stick for determining a metric is on the words and content of the news and the reports. News that has praised the first lady can be categorized by positive coverage; Reports criticizing either the First Ladies or the nations that can damage the national image are considered as negative coverage; other news reporting the objective facts and small judgments are considered as neutral coverage.

## 3. National Image

### 3.1 National Image

The image of the country has a concept of international relations and its application. “National image is how people, at home and abroad, understand a country’s politics, economy, society, culture, and geography. Politics includes government credibility, diplomatic capacity, and national security; Economy includes financial and fiscal strength, quality and feature of products, and domestic income; Society includes national morale and character, security, stability, and social cohesion; Culture includes scientific and technological strength, educational standards, cultural heritage, and customs and values; Geography includes geographical environment, natural resources and population.” National image is not only the symbol of a nation’s power and its spirit, but also the centered expression of comprehensive national strength. A nation’s image has determined the country’s position in the international public opinion environment. It has also affected whether a nation can survive and enlarge the its international influence.

Thus, appealing national image is a goal strategically pursued by each government, and also an important mean to pursue national interest. A good national image can create a favorable international environment for a country’s development and bring great benefit. Countries around the world put great attention on forming and shaping the national image. 2 (Zhang yonglong, 2012)

Different national image can affect the country in various ways. Being an important asset of a country, favorable national image is an intangible asset that can improve the status, function and influence of the country in the international community. Moreover, it can strengthen the state’s right to speak in the international community for achieving national goals. However, unfavorable national image can cause instable reputation and reduce the role of a country, prevent the country to achieve the goal and fulfill its interest. 3 (Sun Zhong, 2002)

### 3.2 Component Influencing National Image

Both China and North Korea are socialist countries. They have more appealing national image for domestic audience than that of international audience. Affecting international audience’s evaluation toward China and North Korea’s national image can be sorted by three components as follows:

First, it is the differences in social structures. Western countries have always held grudge on socialist countries. People who experience socialist countries through the media often misunderstand the system. Even with an objective perspective, how one view a thing can be different under capitalism and socialism. Thus, interpretation can be highly affected under different social structures. 4 (Jin Canrong, 2016)

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2 Zhang yonglong, *Research on Accurate New Report in Mainland China* [D], Fudan University, 2012-04-06

3 Sun Zhong: *National Image and Its Connotation*, *International Forum*, 2002, page 119

4 Jin Canrong, *from the Perspective of History and Consensus Analysis of the Characteristics of China's National Image* [N], China Reform Forum Net, 2016-12-31



Secondly, it is caused by confinement in cultural exchange. From the writer's perspective, China and North Korea, only recently, have enhanced the cultural exchange with foreign countries. In fact, objectively speaking, foreign cultural exchange has been partially resisted by foreign publics at the same time. In spite of China's reformation, cultural exchange with the West still hinder obstacles to get fully engaged. North Korea, in the other hand, under the enclosed policy lacks cultural exchange that will strengthen their national image.

Thirdly, it is the limited extend of international communication capacity. China has not been recognizing the importance on forming appealing national image toward international audience until now. North Korea's enclosed policy gave even less chance to appeal for. At the same time, lack of experience in enhancing national image by the local press for China and North Korea compare to that of western countries is another reason why they have less appealing national image for international audience.

#### 4. Analysis

##### 4.1 Chinese and South Korean Media Coverage of China and North Korea First Ladies

##### 4.1.1 Chinese Media Coverage of China and North Korea First Ladies

##### 4.1.1.1 Chinese Media Coverage of China First Lady

Table 4.1. Topics on Peng Liyuan from "People's Daily" between January 1<sup>st</sup> to May 31<sup>st</sup> of 2013

Topic	Number of Reports	Percentage (%)
Politics	1441	70.24
Culture	407	19.84
Others	204	9.92
Total	2052	100

Topics of report from "People's Daily" about Peng Liyuan between January 1<sup>st</sup> to May 31<sup>st</sup> of 2013 are categorized as politics and culture and others in Table 4.1. Political issue was the most popular topic for her which is 70.24%, while culture and other topics only take 19.84% and 9.92% respectively.

Table 4.2. Peng Liyuan's identity described from "People's Daily" between January 1<sup>st</sup> to May 31<sup>st</sup> of 2013

Identity	Number of Reports	Percentage (%)
First Lady	1645	80.16
Individual	407	19.84
Total	2052	100

Table 4.2 shows how the "People's Daily" has described Peng Liyuan on the reports between January 1<sup>st</sup> to May 31<sup>st</sup> of 2013. Peng Li-yuan was mentioned as the First Lady of China for 80.16% of the times. However, she was described not as the First Lady but as herself for only 19.84% of the time.

Table 4.3. Report tendency for the First Lady of China, Peng Li-yuan, based on "People's Daily" reports between January 1<sup>st</sup> to May 31<sup>st</sup> of 2013

Reporting Tendency	Number of Reports	Percentage (%)
Positive	1543	75.2
Neutral	509	24.8
Negative	0	0

Table 4.3 shows the Report tendency for the First Lady of China, Peng Liyuan, based on the "People's Daily" reports between January 1<sup>st</sup> to May 31<sup>st</sup> of 2013. There are 75.2% of positive coverage of Peng Li-Yuan, and 24.8% of neutral and none for negative coverage

##### 4.1.1.2 Chinese Media Coverage of Li Sol-ju, the North Korea First Lady

Table 4.4. Topics on Li Sol-ju, the First Lady of North Korea from "People's Daily", between January 1<sup>st</sup> to May 31<sup>st</sup> of 2013

Topics	Number of Reports	Percentage (%)
Politics	325	90.76
Others	33	9.24
Total	358	100

Table 4.4 indicates the different topics from the number of reports on North Korea's First Lady, Li Sol-ju, from "People's Daily", between January 1<sup>st</sup> to May 31<sup>st</sup> of 2013. Out of all the reports 90.76% of them were political reports, while only 9.24% of other topics.

Table 4.5. “People’s Daily” reports on Li Sol-ju’s identity between January 1<sup>st</sup> to May 31<sup>st</sup> of 2013

Identity	Number of Reports	Percentage (%)
First Lady	358	100
Individual	0	0
Total	358	100

Table 4.5 shows number of reports describing Li Sol-ju. She was always reported as the First Lady of the North Korea and not as an individual from “People’s Daily” reports.

Table 4.6. Report tendency for the First Lady of North Korea, Li Sol-Ju based on “People’s Daily” reports between January 1<sup>st</sup> to May 31<sup>st</sup> of 2013

Reporting Tendency	Number of Reports	Percentage (%)
Positive	188	52.52
Neutral	167	46.64
Negative	3	0.84

Table 4.6 shows the report tendency of “People’s Daily” reports about Li Sol-ju between January 1<sup>st</sup> to May 31<sup>st</sup> of 2013. During this time period, positive coverage was published 188 times which takes 52.52% of all reports. Neutral coverage takes 46.64% and negative coverage takes 0.84% of all reports.

#### 4.1.2 South Korean Media Coverage of China and North Korea First Ladies

##### 4.1.2.1 South Korean Media Coverage of China First Lady

Table 4.7. Topics on Peng Liyuan, the First Lady of China from “Chosun Ilbo Chinese Web”, before May 31<sup>st</sup> 2013

Topics	Number of Reports	Percentage (%)
Politics	5	35.71
Others	10	64.29
Total	15	100

Topics of report from “Chosun Ilbo Chinese Web” about Peng Li-Yuan before May 31<sup>st</sup> 2013 are categorized as politics and others in Table 4.7. Surprisingly, reports from “Chosun Ilbo Chinese Web” about Peng Li-Yuan were mostly other than politics. Politics only share 35.71% of the reports, while 64.29% of the reports were others.

Table 4.8. “Chosun Il Bo Chinese Web” reports on Peng Li-Yuan’s identity before May 31<sup>st</sup> 2013

Identity	Number of Reports	Percentage (%)
First Lady	9	57.14
Individual	6	42.86
Total	15	100

Table 4.8 shows the reports on Peng Li-Yuan’s identity from “Chosun Ilbo Chinese Web” before May 31<sup>st</sup> 2013. Peng Li-Yuan was depicted more as the First Lady of China rather than as herself. Reports about the First Lady take 57.14% while as an individual 42.86% of the reports were published.

Table 4.9. Report tendency for the First Lady of China, Peng Li-Yuan based on “Chosun Ilbo Chinese Web” reports before May 31<sup>st</sup> of 2013

Reporting Tendency	Number of Reports	Percentage (%)
Positive	6	42.86
Neutral	9	57.14
Negative	0	0.84
Total	15	100

Table 4.9 shows the report tendency for the First Lady of China, Peng Liyuan, based on “Chosun Ilbo Chinese Web” reports before May 31<sup>st</sup> of 2013. Neutral reports accounted for the most, up to 57.14%. Positive reports were slightly lower which is 42.86%, and no negative reports were published from it.

##### 4.1.2.2. South Korean Media Coverage of North Korea First Lady

Table 4.10. Topics on North Korea First Lady, Li Sol-ju, from “Chosun Ilbo Chinese Web” before May 31<sup>st</sup> 2013

Topics	Number of Reports	Percentage (%)
Politics	3	23.08
Others	11	76.92
Total	14	100

Reports on different topics of Li Sol-ju from “Chosun Ilbo Chinese Web” before May 31<sup>st</sup> 2013 is shown in Table 4.10. Political reports only took little portion of the total reports that 76.92% were other topics reports, while political reports only 23.08%.

Table 4.11. Li Sol-Ju’s identity from “Chosun Ilbo Chinese Web” before May 31<sup>st</sup> 2013

Identity	Number of Reports	Percentage (%)
First Lady	12	84.62
Individual	2	15.38
Total	14	100

Table 4.11 shows how reports from “Chosun Ilbo Chinese Web” has described Li Sol-ju’s identity, either as the First Lady or as an individual lady. According to the reports before May 31<sup>st</sup> 2013, 84.62% of total reports have viewed her as the First Lady, and 15.38% of the reports were on the individual lady.

Table 4.12. Report tendency for the First Lady of North Korea, Li Sol-ju, based on “Chosun Ilbo Chinese Web” reports before May 31<sup>st</sup> of 2013

Reporting Tendency	Number of Reports	Percentage (%)
Positive	2	15.38
Neutral	9	61.54
Negative	3	23.08
Total	14	100

Table 4.12 shows the report tendency on “Chosun Ilbo Chinese Web” reports about Li Sol-ju before May 31<sup>st</sup> 2013. Neutral coverage shared 61.54% of the total reports and negative and positive coverage followed.

#### 4.1.3 Compare between Chinese and South Korean Media Coverage on China and North Korea First Ladies

Table 4.13

	Chinese Media		South Korea Media	
	Peng Liyuan	Li Sol-ju	Peng Liyuan	Li Sol-ju
Number of Reports	2052	358	15	14

Table 4.3 shows the number of reports from Chinese media and South Korean media about the first ladies of China and North Korea. It is clear from the table that the amount of reports about the first ladies from Chinese media overwhelms the South Korean’s.

Table 4.14

	Chinese Media				South Korea Media			
	Peng Liyuan		Li Sol-ju		Peng Liyuan		Li Sol-ju	
	Politics	Others	Politics	Others	Politics	Others	Politics	Others
Percentage (%)	70.24	29.76	90.76	9.24	35.71	64.29	23.08	76.92

The topics of Chinese media and South Korean media coverage on the first ladies of China and North Korea are sorted in Table 4.14. As shown in the table, Chinese media coverage of the China first lady, Peng Liyuan, is mostly political reports, however, other topics share 29.76% which is also a high percentage.

While for the North Korea First Lady, Li Sol-ju, political reports share 90.76%, and only small portion is on other topics, 9.24%.

Only 35.71% of the reports about Peng Liyuan from the South Korean media deal with politics, and 64.29% of the reports are on other topics. Likewise, the South Korean media covers 76.92% of the reports with non-political topics on Li Sol-ju, and 23.08% of political topics.

Thus, report topics on Peng Liyuan from the Chinese media are significantly different from those of Li Sol-ju, while the South Korean media coverage has no big difference on the topics of the two ladies. Moreover, the Chinese media mainly deal with political issues and the South Korean media mainly reported non-political issues.

Table 4.15

	Chinese Media				South Korea Media			
	Peng Liyuan		Li Sol-ju		Peng Liyuan		Li Sol-ju	
	First Lady	Individual	First Lady	Individual	First Lady	Individual	First Lady	Individual
Percentage	80.16	19.84	100	0	57.14	42.86	84.62	15.38

The identities of Chinese media and South Korean media depicted on the first ladies of China and North Korea are sorted in Table 4.15. As the table shows, most of the reports represented Peng Liyuan as the First Lady, but there is still one fifth of reports portrayed her as an independent individual.

Furthermore, the Chinese media covers Li Sol-ju only as the first ladies of North Korea. The South Korean media coverage on Peng Liyuan's identity was almost half of the First Lady of China and half of an independent individual, it was 57.14 to 42.86%.

For Li Sol-ju, the South Korean media has few reports as her an independent individual and 84.62% of the reports as the presidential spouse.

The South Korean media has more diverse identities for Peng Liyuan when compared to the Chinese media. On the other hand, the identities for Li sol-ju demonstrated in the Chinese media or the South tend to be simplistic.

Table 4.16

	Chinese Media						South Korea Media					
	Peng Liyuan			Li Sol-ju			Peng Liyuan			Li Sol-ju		
	Positive	Neutral	Negative	Positive	Neutral	Negative	Positive	Neutral	Negative	Positive	Neutral	Negative
Percentage	75.2	24.8	0	52.52	46.64	0.84	42.86	57.14	0	15.38	61.54	23.08

Report tendency of the Chinese media and the South Korean media on the First Ladies is sorted in Table 4.16. The table tells that most reports from the Chinese media positively reported Peng Liyuan, they share 75.2% of reports, and 24.8% of neutral reports and no negative reports are found. Positive and neutral reports for Li Sol-ju have similar percentile, each with 52.52% and 46.64% of reports along with 0.84% of negative reports.

The South Korean media coverage of Peng Liyuan has little difference between positive and neutral reports with none of negative reports. Positive reports are 42.86% and 57.14% of neutral reports. Reports about Li Sol-ju are generally neutral, following with negative and positive reports.

To sum up, there are no negative reports on Peng Liyuan from both the Chinese media and the South Korean media. The Chinese media tend to have more positive reports than that of the South Korean media.

The Chinese media has far more positive reports of Peng Liyuan than that of neutral reports, while the South Korean media has around the same amount of positive and neutral publishes of Peng Liyuan. Also, the Chinese media mostly reported positive and neutral news, and a very little negative news that positive reports greatly exceed negative ones.

The South Korean media has neutral reports at most. Accumulating positive and neutral ones would surpass the amount of negative reports, but just by positive and negative reports, more negative ones are found.

#### 4.2 Perspective of Chinese media and South Korean media of National Images of China and North Korean and their first lady

##### 4.2.1 Perspective of the Chinese media of National Images of China and North Korean and their the first lady

###### 4.2.1.1 Perspective of the Chinese media of National Images and the first lady of China

However, on the other hand, it also reflects that China is still catching up in terms of the social and cultural development. When the First Lady's attention only lay in politics and rarely get involved in other aspects of social life, it indicates that this country can focus on the other social and cultural development in an extremely limited way. Apparently, this is not conducive to China's overall development of the image of a great power. 5 (<http://en.people.cn/>)

Secondly, the Chinese media coverage of Peng Liyuan as the presidential spouse is over 80%. It shows how well she has kept her reputation as the presidential spouse among wide participation in all aspects of the country, which also proves the woman's right has been entrusted by the nation.

Lastly, viewing reporting tendency of Peng Liyuan from the Chinese media, positive reports overwhelm the amount of neutral reports, while none of negative reports are found.

Too many positive reports might cause the Chinese media to be considered biased, while no negative reports can be viewed heavily censored media in China. All public opinion to be highly convergent is hardly possible in a country with unfettered rights to press. Therefore, it implies high degree of centralization by the central government. This is unfavorable to the construction of the true socialist democracy. 6 (<http://cnnews.chosun.com/>)

###### 4.2.1.2 Perspective of the Chinese media of National Images and the First Lady of North Korea

First of all, from the Chinese media reports on the topics of North Korea First Lady, Li Sol-ju, it is possible to notice that the political theme has reached 90%. This is not only in line with the fact that the international community has only been concerned about the North Korea politically in recent years, but also reflects the importance and sensitivity of the North Korea on the international political stage. Furthermore, this cast the economic and social development is

5 People.cn [N], 2013-01-01 ~ 2013-05-02, 2013

6 Cn.chosun.com [N], ~ 2013-05-02

underdeveloped in North Korea, and the lack of exchanges and cooperation with outside world. Reports about Li Sol-ju also projected the national image of North Korea with such conditions. 7 (Liu Yanfang, Zhang Ji, 2008)

Secondly, the Chinese media has always reported Li Sol-ju as the presidential spouse. This represents the conservative national image of the North Korea, and the restriction of woman's social status as a spouse, reflecting the North Korean society is not open-minded. However, being conservative due to political sensitivity shows political alliance between China and North Korea.

Lastly, report tendency on Li Sol-ju's reports show positive reports are a little more than neutral reports, and barely negative reports are published. This tendency does not, in any case, lead to the issue of North Korea's national image. On the contrary, it shows the Chinese media taking into account the importance of diplomatic factors in the report and commitment to the will of the government.

#### 4.2.2 The national image of China and North Korea from the media of South Korea

##### 4.2.2.1 China's first lady and its national image from the media of South Korea

First of all, from the theme of South Korea's media reporting the first lady of China, Peng Liyuan, it is shown that the political theme was slightly less reported than the other themes. A report on the first lady of another nation can reflect how the international community sees the nation she belongs to and how people in the nation which reported see the reported nation. Therefore, in the political theme of the report was slightly less than the other themes of the report, it was shown that, from the perspective of South Korea, China can cause concern not only in the political aspect, but also has many other areas to be noticed. Therefore, it reflects how South Korea recognizes China from the perspective of international position and influence. At the same time, it also shows a trend that China has developed in many aspects comprehensively; so many parts of Chinese society can become a kind of report.

Second, from the media of South Korea reporting China's first lady, Peng Liyuan, it can be seen that the report related with her as the wife of president was only slightly more than an individual. This presents that, from the perspective of South Korea, Chinese women are much free, indicating that it recognized China's openness. This is a highly favorable reflection about the fact China has made efforts to build up an image of great nation on the international community.

Lastly, from the media of South Korea reporting China's first lady, Peng Liyuan, it can be shown that there are more neutral reports than positive ones, and there are no negative ones about her. First of all, the fact neutral reports are slightly more than positive ones indicated the neutrality of South Korean media. However, there is no negative report, which means there are far more positive ones. It indicates the international community recognized China's positive international position and influences. On the other hand, it also reflects the international community has not understood China yet. With fully understating it with objective standards, there must be some negative reports. This also reflects that China's image in the international community is still in the stage of development rather than being matured, and its image is a great nation which still has a part to be more developed.

##### 4.2.2.2 North Korea's first lady and its national image from the media of South Korea

First of all, from the media reports of South Korea on North Korea's first lady Lee sol-ju, it is found that the reports which are related with politics are far less than other reports. North Korea has the great influence on international community. South Korea only reported only 23% of political issues on North Korea, and it reflects South Korea's high interest in North Korea. For South Korea, it is necessary not only to understand the politics of North Korea, but also to let its people know North Korea in a comprehensive way. This also reflects the political needs of South Korea to some extent. On the other hand, Korea and North Korea should have the theme of communication besides politics. This is why you can find the report themes in various fields.

Second, from the reports of South Korea on South Korea's first lady, Lee sol-ju, it is shown that she was far more reported as the identity of the wife of president than herself. This combined the small proportion of the political theme, and, through this, it could be seen that North Korea is not open-minded. Because the diversity of a woman's role in a nation directly determines whether the image of the nation is open-minded or not.

Finally, from the reports, it is shown that neutral reports account for more than half out of the whole reports, and negative reports are slightly more than positive ones. Neutral reports accounted for more than half, which also reflects that South Korea maintains not to stand by one particular side. In addition, through the trend that the negative reports are slightly more than the positive ones, it can be seen that North Korea considers South Korea as a threat rather than a friendly neighbor. However, this reflects the importance of North Korea as well.

#### 4.3 Problems and Implications

From the comparison of media report about the first lady in China and North Korea and the national image which can be reflected from it, the problem that each image China and North Korea face was separately brought up, and some implications were provided to solve for the nations.

First, China has an image of an emerging power. However, it should not perform only in the range of politics but be recognized as one great nation. As far as politics is concerned, if a nation does not have the sufficient strength in the

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7 Liu Yanfang; Zhang Ji, *A Review of the Research on National Image and China's National Image Strategy* [J], *Exploration*, 2008-04-15

light of economy and defense, it cannot be enough to get an image of nation whose political power is also strong. However, according to the media report, China has been insufficient at these three perspectives so that it ought to establish the image of a big nation, build up its own soft power, make an effort under the society and culture that guarantees the right of people.

For instance, from the the diverse report materials, the objective attitude of news publisher, freedom on speech of the media, all-round developments of women and so on. I could see that Korea could have caught the development of China in many ways, so China cannot solely consider politics, but should see whether other countries are willing to recognize a lot of parts in China. Therefore, China should also actively self-discover and promote an international image that a great nation has for diversification.

Second, North Korea has been highly concerned by the international community for its political system, national strategy, sovereignty over the Korean Peninsula, the nuclear weapon issue and so on. Such concerns, however, are not beneficial for the further development of North Korea. From South Korea's report about the first lady, Lee sol-ju, of North Korea, it can be found that the mysterious atmosphere has been rampant over North Korea. If one nation becomes more developed, it would be more enlightened and get much far from being mysterious. Therefore, North Korea ought to seek for a better way that could stimulate the development of society and the establishment of people living. Only through this way, it could be paid a normal attention from international communities, achieve the active developments, and, eventually, establish a national image that is healthy and positive.

## 5. Conclusion

The theme of the study is 'the first lady and the image of nation'. The national image is regarded as an important component to constitute one nation's "soft power", which fully embodies the comprehensive strength and influence of a nation. Both China and North Korea are highly influential in range from East Asia to worldwide.

The national image of China and North Korea reflects the overall strength of the two nations, as well as the attitudes of other nations around the world towards them. Moreover, the recent transfer of power within the two nations has brought more attention not only to the new generations on leaders and new policies, but also to the first ladies of each nation unavoidably.

The author brought up the national image of China and North Korea based on how the media of China and South Korea has reported about the first ladies of each nation. The author believes China and its image on the international community are same through the images of the first ladies on each nation reflected in the media reports. China has been uprising, but still needs to improve the soft power.

Dealing with the challenges for developing means to assume more responsibilities. North Korea has an important role because of its special status in the world, and also has a mysterious color from the aspects for economy, society and the state system. The author believes that North Korea should make more efforts if it wants to establish a more healthy and influential national image in the world.

At the same time, it was found that Peng Liyuan and Lee sol-ju have things in common in the light of their jobs; both of them are engaged in performing arts. The cultures of China and North Korea have come down in one continuous line, and the professionals who have performed performances have been despised by society since ancient times. However, it can be found that the culture of two nations has been deeply influenced by the west in the wave of globalization. Because western culture regards the artists high and respectful, these two women, whose jobs are included in art industry, could have become enough to be treated as the first lady.

As a result, although China and North Korea still have a long way to be a great nation, the world may see both of them developing under a positive direction. However, the image of a great nation cannot be only one, so that different regions must maintain their unique cultural characteristics.

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# The Guidelines of Product Design from the Vetivers Grass Fiber Innovation (Case Study of the Handicraft Product Group, Phayao Province)

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Received: September 6, 2017

Accepted: October 16, 2017

Online Published: November 28, 2017

doi:10.5539/ass.v13n12p77

URL: <https://doi.org/10.5539/ass.v13n12p77>

## Abstract

This research aims to study the process and the physical property of the vitiate grass fiber by spinning vetiver grass with other natural fibers such as cotton, SamiaRicini, silk and plastic fiber such as plastic rope, wire rope and straw rope. The exploration was conducted by Ban KoSoa women group cooperative settlement, Ban Kae Mai handicraft product group and Ban Don Chai handicraft product group in Pusang District, Phayao Province. The physical properties examination, namely: ASTM D 1059:2001 Standard Test Method for Fiber Size, ASTM D 2256: 2002 Standard Test Method for Fiber Toughness with Hardness and Flexibility fiber Equipment, the results of examination would be brought to determinate for the handicraft product development design. The results from this exploration revealed that the fiber size was 0.73-0.15Ne, the tenacity (toughness) as maximum tensile strength was 4.75-9.97 kgf and the elongation at break was 7.73-11.48 percentages. The vetiver grass fiber mixed with straw rope had the tenacity as maximum tensile strength with differently at the statistically significant level of .05, the tenacity as maximum tensile strength average at 9.9 kgf, the vetiver grass fiber mixed with cotton fiber had the tenacity as maximum tensile strength with differently at the statistically significant level of .05, the tenacity as maximum tensile strength average at 6.60 kgf. The vetiver grass fiber mixed with wire rope had the highest elongation at break with differently at the statistically significant level of .05 by with the elongation break was 11.48 percentage. The vetiver grass fiber mixed with SamiaRicini fiber had the elongation break point with differently at the statistically significant level at .05, the elongation at break was 11.6 percentage. According to the handicraft product development guideline from the physical property of the vetiver grass fiber on the basis of this finding, the strength fiber as the vetiver grass fiber mixed with straw rope fiber or cotton fiber could be used for supporting weight product requirement, the elasticity fiber as the vetiver grass fiber mixed with straw rope fiber or SamiaRicini could be used for product which soft and flexibility requirement, the utility from using fiber color that spinning for beauty could be used the vetiver grass fiber that spinning and mixed with other fiber.

**Keywords:** Vetiver grass fiber, Development, Handicraft

## 1. Introduction

Vetiver is a kind of Poaceae family most closely related to corn, sorghum, sugar cane and lemon grass, native to Northern India, Bangladesh, and Burma, according to Land Development Department operating had collected the vetiver grass types in Thailand and also in other countries. The vetiver grass had been selected about 10 types of vetiver grass in domestic and one type from Sri Lanka by Land Development conducting. The vetiver grass has been widely spread about 12 types throughout the globe, 2 types with 10 vetiver grass varieties in Thailand namely, 1) vetiver essential oil or *Vetiveriazanioides*(L) Nash with 6 vetiver varieties such as NakhonSawan, Kamphangphet1, Loei, Roied and PrachuapKhiri Khan 2) *Vetiverianemoralis*A. Camus with 4 varieties such as Sri Lanka, Kamphangphet2, Suratthani and Sonkla (Tassanapilom, S., n.d.) "Vetiver": King Rama IX of Thailand had advocated the idea of vetiver grass studies provided that prevent soil erosion, in addition to conserve soil moisture. The Land Development Department had explored the area and operated for growing vetiver grass, investigated a including other utilities of vetiver grass since 1991 until now. In 1993, the King ordered the all government agencies capability for vetiver propagation collaborate with the Land Development Department so as to produce and apportion the vetiver sprout to the target group sufficiently. The King loyal thought about the vetiver leaf were used as materials that having enough if they had been promoting operation into industrial level. As a result of the vetiver grass has many leaves and a fast growth, therefore the leaves of vetiver should have been studied for other suitable purpose in order that not affected the main purpose which for preventing the soil erosion also help to block the runoff of surface water. Consequently, using the vetiver grass for other relevant purpose should consider about planting area especial in order to having volume enough on demand for producing handicraft products. Phayao province has been the largest vetiver grass planting area in the North of Thailand, the growing of the vetiver grass were investigated and conducted by the Land Development Department, there had been begun the growing experiment as prototype along the mountain at the Land Development Station of province as well as distributed agriculturists the sprouts in the areas for growing in their areas as preventing soil erosion and making planted area for growing vetiver grass, the agriculturists had known the



vetiver grass benefits as material object (Provincial Community Development office of Phayao Province, 2009). Consequently, the Department of Industrial Promotion Region 1 had managed the handicraft from the vetiver grass training for the villagers in the village, therefore the villagers they form into group which attention as the SatriSahakornNikom (Women Group Cooperative Settlement) had taken the harvested vetiver grass to make craft products therefore, this has produced additional income for the villagers until now.

Presently, the vetiver handicraft products development have the guidelines of development such as the form and the figure so as to be suitable usability, processing technique method development, product quality development, and also the vetiver fiber grade development for textile. However, these products were produced by manufacture industry technology thus, most benefits become to the property of capitalists group, unfortunately the villager group which a previously produced the handicraft would lose opportunity. At present time, using eco-friendly and natural material product campaign to resolve global warming effect has been the international emphasizing, obviously at campaign advertising such as stopping using the plastic and replacing with cotton bag, selecting natural materials especial plant fiber material by weaving technique method for various item styles on domestic also international market demand.

From this research investigated, the handicraft production have many processing step technique such as boiling, sun drying, weakening, compressing and spinning, whereas preparing process which had a weak and a limitation for instance, a limitation length of leaf is 80-100 centimeters with too short and a limitation of weaving style, however, if this limitation could be eliminated as well as approving technique method or increasing strength quality, adding technique method to assists the beauty that could be able promote and develop product level bring to international standardization accompany with more various style. For this study, the researcher had investigated materials which were natural fiber from local and available easy find out in Phayao area consists of cotton fiber, SamiaRicini silk including plastic rope which made from plastic rope synthetic these available easy to find at local. Researcher realized about the importance and utility from mixing and developing vetiver fiber material could be able strengthen or sticky physical property, longer, able be producing handicrafts with various styles in any handicraft technique method such as weaving, weaving and tying which were increasing the alternative styles, adding value and worth for vetiver grass handicraft products

## **2. Research Objectives**

To analyze the properties testing of the vetiver grass fiber that are size of fiber, the tenacity of fiber and the elasticity of fiber mixed with the natural fibers such as the cotton fiber, the SamiaRicini fiber and the silk fiber and the vetiver grass fiber mixed the plastic fiber such as the plastic rope fiber, the wire rope fiber and the straw rope fiber conduce to the handicraft product development guidelines.

## **3. Research Methodology**

This research is the experimental method by collecting data from the vetiver grass fiber sampling with the physical properties testing, the results of examination were used to analysis data by statistical technique, in sequence at follows 1) studying the literature review and the research with concern the vetiver grass fiber development as well as the physical properties of fibers 2) examination of the vetiver fiber mixed other material fibers as the natural fibers such as the cotton fiber, the SamiaRicini fiber and the silk fiber as well as the plastic fibers such as the plastic rope fiber, the wire rope fiber and the straw rope fiber and 3) studying of the vetiver grass fiber physical properties testing in terms of the strength of fiber, the size of fiber and the elasticity of fiber for selecting a suitable properties usage to create the handicraft products.

### *3.1 Scope of research*

The delimitation of the study included:

Stage 1: Area scope and sampling of studying the vetiver grass fiber materials with planting and spinning was in Phayao province.

Stage2: Process scope and procedure processing of the vetiver grass by studying 3 groups of the vetiver handicraft producers, namely; Ban KoSoa group cooperative settlement, Ban Kae Mai handicraft product group and Ban Don Chai handicraft product group in Pusang District, Phayao Province. The experiment was conducted by processing of the vetiver grass mixed with the natural fibers and the plastic fibers with easily find out at the local area, the spinning vetiver grass mixed with other materials were examined the physical properties by measuring the fiber size, the fiber strength and the fiber elasticity in order to analyze the physical properties of vetiver grass fiber types.

Stage 3: Scope of population and sampling in this experiment, the spinning vetiver grass fiber mixed with 3 natural fibers namely: the cotton fiber, the SamiaRicini fiber and the silk fiber, the plastic fibers namely: the plastic rope fiber, the wire rope fiber and the straw rope fiber. The variables of this study

1. Independent variables, namely: the spinning vetiver grass fiber mixed with the natural fibers and the plastic fibers
2. Dependent variables, namely: fiber size, fiber tenacity and fiber elasticity.

### *3.2 Research instruments*

Stage 1: The vetiver grass fiber was span and braid into strand as 2, 3 and 4 millimeters, with each strand 30 meters for physical properties examination consist of the size of fiber, the strength of fiber and the elasticity of fiber.

Stage2: The spinning vetiver grass fiber mixed with the natural fiber such as the cotton fiber, the SamiaRicini fiber and the silk fiber with the ratio leaves of vetiver grass 2 parts per the natural fiber 1 part that make 3 strands with the size as 2, 3 and 4 millimeters with each strand 30 meters

Stage3: The spinning vetiver grass mixed with the plastic fiber such as the plastic rope fiber, the wire rope fiber and the straw rope fiber with the ratio leaves of vetiver grass 2 parts per the plastic fiber 1 part that make the strands as 2, 3 and 4 millimeters with each strand 30 meters

Stage4: The equipment for fiber strength testing is TENSILE TESTING MACHINE (INSTRON MODEL 5566) of Textile Testing Center, Thailand Textile Institute.

3.3 Data collection

Using the spinning vetiver grass fiber and braids within 2, 3 and 4 millimeters, cut if for each strand about 250 millimeters to 10 strands per each size, ASTM D 1059:2001 Standard Test Method for Fiber Size, ASTM D 2256: 2002 Standard Test Method for Fiber Toughness with Hardness and Flexibility fiber by TENSILE TESTING MACHINE (INSTRON MODEL 5566), the elasticity fiber testing with the speed ratio testing 300 millimeters per minute, in the time of testing 250 millimeters, moisture condition testing at 21±0°C, relative humanity at 65±2 percentages and the elongation at break measurement .

3.4 Data analysis

Data analysis on the basic processing of preparing, processing, review literature and data analysis from the physical properties testing such as fiber strength, fiber proportion and fiber elongation. The statistics used for data analysis is mean, percentage, standard deviation and one way analysis of variance (One-Way ANOVA)

4. Data Analysis Results

Researcher divided research results into 4 parts consisted of 1) the physical characteristic data of vetiver grass result 2) the process and procedure of vetiver grass processing result 3) data analysis result of the vetiver grass fiber mixed with other material fibers and 4) the handicraft product development guideline result, as follows:

4.1 The physical characteristics data of the vetiver grass result

Researcher revealed that the vetiver essential oil or *Vetiveriazanioides* in which Sri Lanka type is the most cultivated and commonly find out in Phayao Province that is appropriate and favorable to create the vetiver grass handicraft product because it is a chump, blade is long and wider than *Vetiverianemoralis*. A. Camus, totally dark green leaf and coating with less wax that affect to coarse and not shiny. The time of harvesting of the vetiver grass would be cutting for work in 45-60 days during a rainy season, however, the vetiver grass should not harvest outside the rainy season owing to the vetiver grass leaves will be hard, lean and easily brittle that affect to create product should be not beautiful, as shown in Table 1

Table1.Comparative of the physical characteristic between *Vetiveriazanioides* and *Vetiverianemoralis*

Origin	<i>Vetiveriazanioides</i>	<i>Vetiverianemoralis</i>
	<ul style="list-style-type: none"> <li>- In the middle of Asia which assumes as in India.</li> <li>- It has grown and propagation with commonly</li> </ul>	<ul style="list-style-type: none"> <li>- In the South East of Thailand, Lao, Cambodia and Vietnam.</li> <li>- It can spread propagation in a natural environment with limit water condition</li> </ul>
Bunchgrass	<ul style="list-style-type: none"> <li>- Having clumps with each blade is long and a high parallel</li> <li>- Height of 150-200 cm.</li> <li>- The top of the apex and the culm could be separate into a small piece.</li> </ul>	<ul style="list-style-type: none"> <li>- Having a clumps with each blade is long, spread out and bend down like bunch but it not a high parallel like aroma vetiver grass.</li> <li>- Heightof 100–150cm.</li> <li>-Neither the top of apex nor the culm could not separate into a small piece.</li> </ul>
Leaf	<ul style="list-style-type: none"> <li>- 45–100cm. long, 0.6–1.2cm. wide</li> <li>- A dark green color, totally green at the backside, approximate white at the inside, having the fibrous lines at the surface area when seeing at the sunlight</li> <li>- Having slightly waxy coating was that affect to soft and greasy leaf, at the surface leaf look like a sponge.</li> </ul>	<ul style="list-style-type: none"> <li>- 35–80cm. long, 0.4–0.8 cm. wide.</li> <li>- A pale green color, the backside was fold as triangle, the inside has the same color as the backside but more pale than total leaf, when seeing at the sunlight could not see the fibrous lines at the surface area.</li> <li>- A rough leaf, having a few waxy coating affect to the leaf is not shiny.</li> </ul>
Fluorescence and flower	<ul style="list-style-type: none"> <li>- The panicle ishigh at 150-250cm.</li> <li>- Mostly, approximate purple.</li> <li>- A flower have not the appendage.</li> </ul>	<ul style="list-style-type: none"> <li>- The panicles ishigh at1–00150cm.</li> <li>- Various colors consisted of a white cream to a purple color.</li> <li>- A flower have the appendage</li> </ul>
Seed	-A seed is a bigger than <i>Vetiveria nemoralis</i>	-A seed is a smaller than <i>Vetiveria zanioides</i> .

4.2 The process and procedure of vetiver grass processing result

Researcher using the vetiver essential oil which Sri Lanka type as the type that the producers had been cultivating in the area of Phayao Province and using for the various vetiver grass handicraft, the processing procedure as the follows,

1) Preparing of the vetiver grass fiber by using the vetiver grass after 1 year of planting, the time of harvesting the vetiver leaves should be during a rainy season within 45-60 days owing to getting the leaf about 80-120 centimeters long, the leaf cutting at the bottom of stem by measuring from the stem about 20 centimeter, boil the leaves in the boiling water for 20 minutes continually, sun drying for 1-2 days until it dry depend on the intense sunlight and the leaf was were weakened as the straight line with 2-3 millimeter in order to make an equal straight line, from the following in Figure 1.



Figure1. The vetiver grass drying and weakening from: Chandhasa, R. (2011).

Bringing the vetiver grass leaf with 80-120 centimeters had been span and braided as the strand owing to make the strong fiber that could be supporting a heavy product, therefore it was a suitability for supporting a heavy product. Beside the vetiver grass with soft, flexibility or emphasizing of beautiful color, that could be mixed with other fibers such as cotton fiber, SamiaRicini fiber, silk fiber, plastic rope, wire rope and straw rope, as showing at Figure 2-3

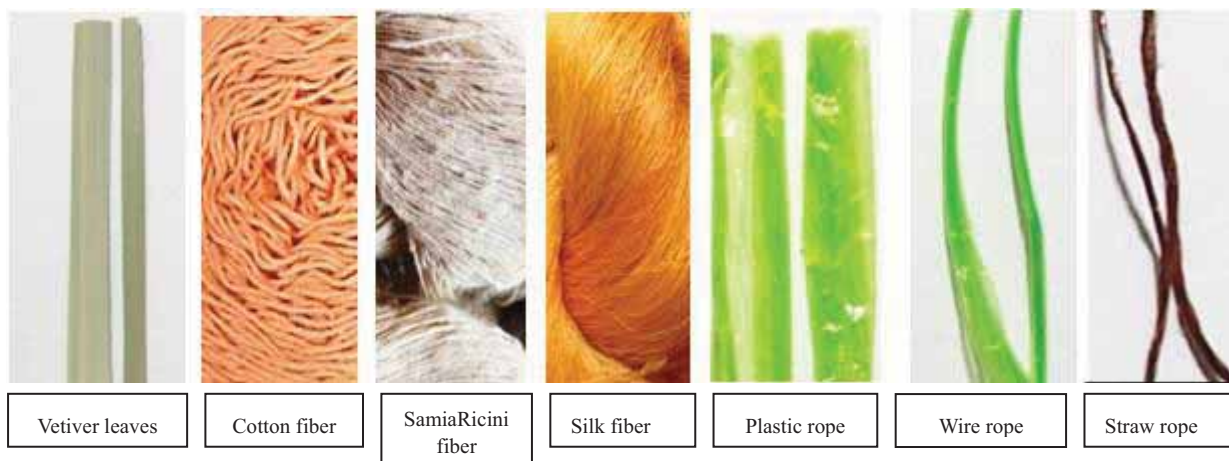


Figure 2. The spinning and braiding the vetiver grass fiber mixed with other fiber  
From: Chandhasa, R., 2014

4.3 The result of the vetiver grass fiber mixed with other material

The physical properties of the spinning vetiver grass fiber mixed with the natural fibers and the plastic fibers, totally 7 fibers, the results shown at table 2-4

Table 2. The physical properties of the fibers (N=30)

The Physical properties fibers	Port portion (Ne)				Maximum tensile strength (Kg.force)		Elongation at break (Percentages)	
	Min	Max	$\bar{x}$	SD.	$\bar{x}$	SD.	$\bar{x}$	SD.
The vetiver grass fiber	0.73	0.31	0.48	0.22	5.89	2.36	7.73	1.69
The vetiver fiber mixed with cotton fiber	0.52	0.25	0.37	0.14	6.06*	1.66	9.67	1.42
The vetiver fiber mixed with SamiaRicini fiber	0.55	0.25	0.37	0.14	5.44	1.20	11.09*	3.99
The vetiver fiber mixed with the silk fiber	0.55	0.28	0.42	0.14	5.35	0.97	7.89	1.03
The vetiver fiber mixed with plastic rope fiber	0.71	0.39	0.55	0.16	4.75	1.68	9.95	2.26
The vetiver fiber mixed with wire rope fiber	0.66	0.28	0.50	0.20	9.97**	3.88	11.48**	2.85
The vetiver fiber mixed with straw rope fiber	0.47	0.15	0.29	0.16	7.89	0.73	11.16	1.43
N					30			

\* The vetiver fiber mixed with the natural fibers had the highest average

\*\* The vetiver fiber mixed with the plastic fibers had the lowest average



Figure 3. The spinning and braiding the vetiver grass fiber mixed with other fiber  
From: Chandhasa, R., 2014

As shown from table 2, the spinning vetiver grass were examined the physical properties of the proportion fiber overall was with range 0.73-0.15 Ne, the tenacity (tensile strength) was with range 4.75-9.97 kilogram force and the elongation at break point was with range 7.73-11.48 percentages which is explained as the follows; The spinning vetiver grass fiber mixed with the plastic fiber which the highest tenacity level was the spinning vetiver grass fiber mixed with the wire rope fiber by means of the maximum tensile strength of the spinning grass fiber mixed with the wire rope fiber with the average was 9.97 kilogram force with the average, the standard derivation was 3.88, as the follows, the spinning vetiver grass mixed with the straw rope fiber, having the maximum tensile strength with the average was 7.89 kilogram force, the standard derivation was 0.73 and the spinning vetiver grass fiber mixed with the plastic rope, having the maximum tensile strength with the average was 4.75 kilogram force and the standard derivation was 1.68, respectively. The elongation at break of the spinning vetiver grass fiber mixed the plastic fiber which the highest level was the spinning vetiver grass fiber mixed with the wire rope fiber by means of the elongation at break of the spinning vetiver grass fiber mixed with the wire rope fiber was the 11.48 percentages, the standard derivation was 2.85, at the follows the spinning vetiver grass fiber mixed with the straw rope fiber, having the elongation at break was 11.16 percentages, the standard derivation was 1.43 and the spinning vetiver grass fiber mixed with the straw rope fiber, having the elongation at break was 9.95 percentages and the standard derivation was 2.26, respectively.

The spinning vetiver grass fiber mixed with the natural fiber which the highest tenacity level was the spinning vetiver grass fiber mixed with the cotton fiber by means of the maximum tensile strength of the spinning grass fiber mixed with the cotton fiber with the average was 6.06 kilogram force, the standard derivation was 1.66, as the follows, the vetiver grass fiber, having the maximum tensile strength with the average was 5.89 kilogram force, the standard derivation was 2.36 and the spinning vetiver grass fiber mixed with the SamiaRicini fiber, having the maximum tensile strength with the average was 5.44 kilogram force and the standard derivation was 1.20, respectively The elongation at the break point of the spinning vetiver grass fiber mixed the natural fiber which the highest level was the spinning vetiver grass fiber mixed with the SamiaRicini fiber by means of the elongation at break of the spinning vetiver grass fiber mixed with the SamiaRicini fiber, was the 11.06 percentages, the standard derivation was 3.99, at the follows the spinning vetiver grass fiber mixed with the cotton fiber, having the elongation at break was 9.67 percentages, the

standard derivation was 1.42 and the spinning vetiver grass fiber mixed with the silk fiber, having the elongation at break point was 7.89 percentages and the standard derivation was 1.03, respectively.

As shown form table 3 when compared the maximum tensile strength of fiber testing for difference between means from two separate revealed the vetiver grass fiber types had the maximum tensile strength with differently at the statistically significant level of .05 that was: The spinning vetiver grass fiber mixed with the cotton was a statistically significant level at .05 difference in terms of the maximum tensile strength among of the spinning vetiver grass fiber mixed with the wire rope fiber and the spinning vetiver grass fiber mixed with the wire rope fiber, while the vetiver grass fiber was no statistically significant difference in terms of the maximum tensile strength among of the spinning vetiver grass fiber mixed with the SamiaRicini fiber and the spinning vetiver grass fiber mixed with the silk fiber. Furthermore, there was a statistically significant level at .05 differences in terms of the maximum tensile strength between the spinning vetiver grass fiber mixed with the wire rope fiber and other fibers

Table 3.The difference between means testing of the tensile strength of fibers

Lists of fibers	Mean	Type of fibers						
		1	2	3	4	5	6	7
1 The vetiver grass fiber	5.89	762.	385.	299.	032.*	.000*	.000*	.000*
2 The vetiver mixed with the cotton fiber	6.06		.242	.180	.015*	.000*	.000*	.001*
3 The vetiver fiber mixed with SamiaRicini fiber	5.44			.864	.199	.000*	.000*	.000*
4 The vetiver mixed with the silk fiber	5.35				.266	.000*	.000*	.000*
5 The vetiver mixed with the plastic rope fiber	4.75					.000*	.000*	.000*
6 The vetiver mixed with the wire rope fiber	9.97							.000*
7 The vetiver mixed with the straw fiber	7.89							

\* Differently at the statistically significant level at .05

Table 4.The difference between percentages testing of the elongation at break of fibers

Lists of the fibers	Mean	Type of fibers						
		1	2	3	4	5	6	7
1 The vetiver grass fiber	7.73	.001*	.000*	.797	.000*	.000*	.000*	.000*
2 The vetiver mixed with the cotton fiber	9.67		.018*	.003*	.629	.003*	.013*	
3 The vetiver fiber mixed with SamiaRicini fiber	<b>11.09</b>			.000*	.058	.515	.904	
4 The vetiver mixed with the silk fiber	7.89				.001*	.000*	.000*	
5 The vetiver mixed with the plastic rope fiber	9.95					.011*	.044*	
6 The vetiver mixed with the wire rope fiber	<b>11.48</b>							.569
7 The vetiver mixed with the straw fiber	11.16							

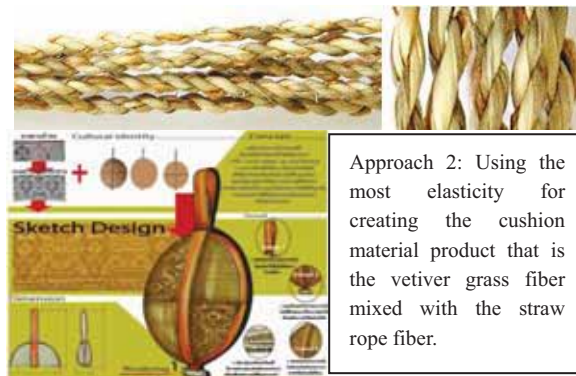
\* Differently at the statistically significant level at .05

As shown form table 4 when compared the elongation at break percentages of fibers testing for difference between means from two separate revealed the vetiver grass fiber types had the elongation at break percentages with differently at the statistically significant level of .05, the result was: The spinning vetiver grass fiber mixed with the SamiaRicini fiber was a statistically significant level at .05 difference in terms of the elongation at break percentages among of the vetiver grass fiber, the spinning vetiver grass fiber mixed with the cotton fiber and the vetiver grass fiber mixed the silk fiber, beside the spinning vetiver grass fiber mixed with the SamiaRicini fiber was no statistically significant difference in terms of the elongation at break among of the spinning vetiver grass fiber mixed with the plastic rope fiber, the spinning vetiver grass fiber mixed with the wire rope fiber and the spinning vetiver grass fiber mixed with the straw rope fiber. Moreover, the spinning vetiver grass fiber mixed with the wire rope fiber was a statistically significant level at .05 difference in terms of the elongation at break percentages among of the spinning vetiver grass fiber mixed with the plastic rope fiber, the spinning vetiver grass fiber mixed with the cotton fiber and the spinning vetiver grass fiber mixed with the silk fiber, beside the spinning vetiver grass fiber mixed with the wire rope fiber was no statistically significant difference in terms of the elongation at break among of the spinning vetiver grass fiber mixed with the SamiaRicini fiber and the spinning vetiver grass fiber mixed with the straw rope fiber.

4.4 The handicraft product development guideline analysis result

The handicraft product development guideline analysis from the exploration physical properties, the results revealed that bringing the vetiver grass fiber was span and braid and mixed with the natural fibers and the plastic fibers which affected to differential properties in terms of durable strength for pulling strength and flexibility. Consequently, researchers have selected from the fiber properties for 3 guidelines of the handicraft product development, as follows:

Approach 1: Using the strongest fiber for creating a big bag product with could be used for supporting a heavy product that is the vetiver grass fiber mixed with the wire rope fiber which could be supporting the weight with the average at 9.97 kilogram force as well as having the most elasticity is shown in Figure 4.



Approach 2: Using the most elasticity for creating the cushion material product that is the vetiver grass fiber mixed with the straw rope fiber.

Figure4. The applying the fiber usage to a bag productfrom: Chandhasa, R. 2014

Approach 2: Using the most elasticity for creating the pillow product or the cushion material that are the vetiver grass fiber mixed with the wire rope fiber, the vetiver grass fiber mixed with the SamiaRicini fiber and the vetiver grass fiber mixed with the straw rope fiber, as shown in picture 5 and Figure 6.



Approach1:Using the strongest fiber for creating a big bag product with could be used for supporting a heavy product that is the vetiver grass fiber mixed with the wire rope fiber

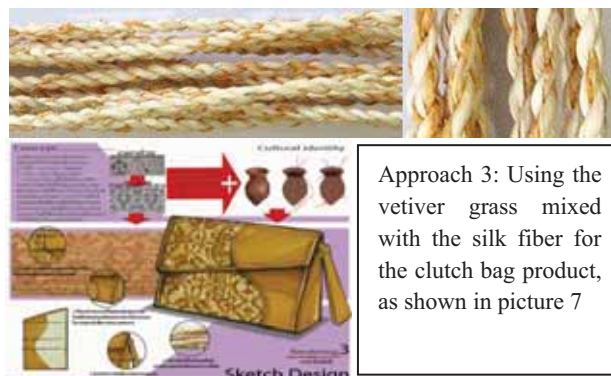
Figure5. The applying the fiber usage to a seat cushion productfrom: Chandhasa, R. 2014



Approach 2: Using the most elasticity for creating the pillow product that is the vetiver grass fiber mixed with the SamiaRicini fiber

Figure6. The applying the fiber usage to the pillow productFrom: Chandhasa, R. 2014.

Approach 3: Using the vetiver grass mixed with the silk fiber for the clutch bag product, as shown in Figure 7



Approach 3: Using the vetiver grass mixed with the silk fiber for the clutch bag product, as shown in picture 7

Figure 7. Applying the vetiver grass fiber usage to the clutch from: Chandhasa, R. 2014.

## 5. Conclusion and Discussion

The conclusion of this research revealed the aroma vetiver grass which Srilanga line had obviously suitable properties for creation handicraft product owing to having a long of leaf with 80-120 centimeters, soft and shiny leaf, bring the leaf for using should have cut leaf apex about 20 centimeters because it had some small sharp thorns, the aims of boiling the leaves in boiled water mixed with some salts continually in 15-20 minutes for making vetiver grass leaves with soft, sticky and more white, rinse with 1 time as well as drying at the air for 1-2 days so as to be hardly moldy, the aims of weakening vetiver grass to make a straight line with equally and the span leaves of vetiver were braids on specific proportion

The physical properties results had been explored, span braids vetiver fiber proportion had been measured about .73-0.15 Ne with standardized tread with various proportions due to spinning braids vetiver grass leaves process which using 3-5 vetiver grass lines and specifying physical measurement by craftsmen could not control the rotation force of spinning of each craftsmen therefore to the vetiver grass fibers had difference proportion, consequently they also had difference tightness and strength.

The spinning vetiver grass fiber mixed with the natural fibers had a highest tensile strength with range 5.35-6.06 kilograms force, spinning vetiver grass fiber mixed with the plastic fibers had a tensile strength with range 4.75-9.97 kilograms force, as a results of mixing the spinning vetiver grass fiber together with the plastic fibers could be able increasing tensile strength more than a pure vetiver grass fiber and mixed with the natural fibers, besides the spinning vetiver grass fiber mixed with a clear plastic rope had a lowest tensile strength because it was gauzy and the smallest size with average 0.55 Ne (Total weight [g] x 1,000/ Total length [m.]). For applying research results, being selective fiber type by consideration the physical properties in terms of strength, in terms of elongation as for handicraft products that could be supporting a heavy weight product or soft texture or using the colors from mixed fibers for beauty. For selecting the vetiver grass fibers from each properties, researcher had indicated 3 guidelines of vetiver grass handicraft product that were

1. Strength fiber could be used for supporting a heavy product such as a big bag, a seat cushion made from the vetiver grass fibers that could be more support a heavy product, which could be using the vetiver grass fiber mixed with a wire rope fiber or straw rope fiber.
2. Using of elongation fiber could be used for requirement product of softness and elasticity likes pillow or cushion material that could be using the vetiver grass fiber mixed with wire rope fiber, SamiaRicini fiber or straw rope fiber.
3. The usefulness from the colors of mixed fiber for beauty could be able used the spinning vetiver grass fiber mixed with all other materials to create various handicraft products or product which not consideration for weight supporting due to having colorful colors, the vetiver grass fiber mixed with silk fiber could be able used as the small hardbacks or accessory items, as the silk fiber could express valuable feeling with the own material with related to Chomchalow, N. (2011), had said the vetiver grass had been an excellent material for handicraft due to the fiber form vetiver grass had been adhesive and durable thus it was suitable for handiwork. A campaign of expanding of the vetiver grass planting area for supporting the directly also indirectly usefulness of vetiver grass, the aforementioned also involved with Booth, D. & Nengah, A.A. (2003), had said the studying of the vetiver grass had been a part of school course and recommended the community had to knowledge about the vetiver grass also the promotion of the vetiver grass benefits in the local media as well as many usefulness to use the vetiver grass on other ways such as for roofing and handicraft

Likewise, this research also related with Jongchansittho, P. (2014:2) had said, the handicraft emphasized to make by hand and to use local materials which was a valuable in both beauty and utility, it had a different pattern in each local area; in addition, it must take the afford to create that works, besides it could explain a local people lifestyle in each place, the handicraft could be classified by the characteristics such as categorized by material used: wooden craft, metal craft, categorized by production process: weaving and entwine and categorized by physical style: textile and pottery. These work creations were built and appear by people that call "handicraftsmen", having knowledge and skills which were descended from ancestor and pass on the knowledge to next generation to subsequent so that the knowledge was lived on, there by the native handicraft had been admired as the "creator" and "preceptor" concurrently. In addition, the vetiver grass fiber mixed with other materials process for product creation could be adjusted with suitable size for product, possibly, the spinning vetiver grass fiber mixed with the other fibers could be brought to braid weaving or Macramé knotting technique which has a professional production and materials selection for the handicraft product, which related to Janatam, J., & Sikka, P. (2012:103) the research result revealed that the property of the most natural fibers is breakable if they are folded or bend, therefore fiber processing by weaving and spinning as a strand or braid in order to production forming due to the strand was made by braiding and spinning could be more consistence and could be formed easily in addition a beautiful product also related to Laowattanaphong, S. & Smanchat, S. (2012: 231) exhibited the research results of spinning fiber from the genus *Musa* and a natural fiber form hemp with spinning strand having the highest level of strength at 678.71 Newton which was used as material in furniture manufacturing by using a weave pattern from the wickerwork that presented the beautiful merging of two materials as well as increasing a strength into material for using in other product that could be able supporting weight effectively. In accordance with Soodsang, N. (2016: 179).concepts gained from this research can be applied to wood and can be used for larger composition and dimension, more natural, increased natural adaptive technologies, mirroring the world in need of

sustainment and relaxation from chaos. However, furniture design work should also reflect the special need of elderly people such as for the floor, rounded table corners, strong sofas, and light-weight furniture in moderate size to be movable by the elderly people themselves, independent of others. The growth of the furniture and accessories market also depends on other factors such as investment on various projects by the government sector, the government's policy to increase economic activity, the trust of the private sector of the government policy, real estate, condominium and townhome projects being launched, all are key elements in the development of different types of furniture designs.

## 6. Suggestion

- 1) The experts on fiber had recommended about the vetiver grass fiber selection should select the spinning vetiver grass fiber mixed with cotton fiber, SamiaRicini fiber and silk fiber because they are a natural fiber, having a same property, especially they could be still having a beauty to fiber more than the synthetic fiber
- 2) Interm of the planting vetiver grass promotion in order that use into handicraft should be studying about the vetiver grass leaves quantity that having enough for product demand, if the quality of vetiver grass leaves are not sufficient, the growing more vetiver grass campaign should be promoted to respond the demand in further development.
- 3) In term of using the vetiver grass fiber into textile industrial development, the research result of vetiver grass fiber indicates that the vetiver grass fiber characteristics, such as the fineness, tenacity and elongation are similar to plant fiber that used in fabric weaving. Therefore, the studying of leaf fiber mixed with other plant fibers should be experimental which could be able reeling as a tread and bringing it into fabric weaving owning to a new fabric development of textile industry.
- 4) In term of the process of vetiver grass processing in textile industry should be studying the production in the industry in order to create a new material into producing fabric, further develop to home decoration items and apparel products.

## Acknowledgments

This research was supported by SuanSunandha Rajabhat University.

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# On Eight Grade Students Understanding in Solving Mathematical Problems

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Received: September 8, 2017  
doi:10.5539/ass.v13n12p86

Accepted: October 19, 2017

Online Published: November 28, 2017

URL: <https://doi.org/10.5539/ass.v13n12p86>

## Abstract

Human must have the ability to understand, because understanding can prevent people from misunderstandings and conflicts. Similarly, public junior high school (PJHS) students need to have mathematical understanding ability (MUA) for a reason, that is, MUA is an important part in problem solving. In fact, MUA of PJHS students was still low. This research was conducted to contribute in improving students' MUA. There were 158 students engaged in the experiment classroom as well as in the conventional one taken from PJHS 1, 2, and 4 from district of Deli Serdang, PJHS 17 and 22 from Medan City, Indonesia. Joyful problem based learning (JPBL) approach was applied to attain the purpose of the research. The study used essay-test to measure students' MUA. The score obtained was then analyzed by t-independent test, while student performance in solving MUA problems was described descriptively. Results of the research: (1) Students MUA' score was higher in the experiment classroom than in the conventional one. (2) The improvement of students MUA in the experiment classroom belongs to medium category. (3) The students' performance in MUA was better in the JPBL classroom than it was in the conventional one. Some students faced difficulties both in explaining the solution and in giving example of a mathematical concept. Overall, the students' performance was best at the aspect of presenting problem in mathematics equation. Based on the findings, the study suggests teachers to give reinforcement in both aspect where students lacked of by, for example, encouraging them to solve a variety of problems which eliciting the aspect of explaining and giving examples.

**Keywords:** Mathematical understanding, Mathematical Problem Solving, Joyful Problem Based Learning

## 1. Introduction

Problem solving is an ability or skill very important be acquired, because from birth humans have faced challenging problems that forced him get the solution. The solution that a baby exhibits when he feels thirsty is crying and his mouth moves to find a source of milk. Until we are old, we still face problems, such as the problem of chewing food if the food has a rather hard texture. Problems not only faced by ordinary man, but also experienced by experts in various fields of science and work, and junior school students, certainly.

Assumed that through learning mathematics, the ability of problem solving can be nurtured and grown. This is quite reasonable considering that learning mathematics demands patience, fear, prudence, unyielding spirit, honesty, discipline, consistency, faithfulness and reasoning correctly. Especially when learning mathematics through solving ill-structured problems. Problem solving is the process of applying knowledge in various new and unfamiliar situations (Anderson, et. al., 2001). Mathematical problem solving of course is the process of applying mathematical knowledge into new and unfamiliar mathematical problems.

It can be seen in NCTM (2000) some examples of problem designed to elicit students' problem solving skills, while some other problems have the purpose to elicit the students' reasoning, understanding, representation, communication, and connection skills. In order the students be good at problem solving, they must be qualified in some of these skills, as well as having a good disposition (Kilpatrick, Swafford, & Findell, 2001). In fact, preliminary research turned out to show an unfavorable result in term of the students' mathematical understanding (Minarni, Napitupulu, & Husein, 2016). For this reason, researchers develop instruction materials aimed to improve the ability of mathematical understanding of grade 8 junior high school students.

The results showed that the instruction materials are quite effective in improving the students' mathematical understanding ability [MUA]. The students' achievement in MUA test are 62 from the 100 scale. This indicates that the ability of mathematical understanding improved through implementing Joyful Problem-based Learning (JPBL) (Minarni & Napitupulu, 2017).

In current research, JPBL implemented more widely scope, including 158 students from five schools in District of Deli Serdang and Medan City in the hope that more students will experience improvement in mathematical understanding ability.

## 2. Literature Review

Observing what is mathematics and how importance the role of mathematics in human life, it is natural that students in schools are required to have the ability to understand mathematics, proficient in various mathematical representations, and problem-solving skills (Depdiknas, 2006). Some of these skills (abilities) are components of mathematical proficiency students must possess (Kilpatrick, Swafford, & Findell, 2001). Understanding is knowing what and why something is done, being able to do something but not knowing the underlying science (Skemp, 1987), agreeing with the expert, can look at the characteristics of the deeper concept, seek specific information in a situation quickly, be able to represent a situation, and looking at a situation with a mental model (Nickerson, 1985). Students understand when they build a relationship between new knowledge and incoming knowledge with prior knowledge. According to Marzano & Kendall (2007), students said to understand if new knowledge integrated with existing cognitive structure. Understanding interpreted as the ability to symbolize the knowledge and integration of that knowledge into the cognitive structure already present in a person.

Understanding is the ability to bind relationships between pieces of information, dynamic, changing and developing (Hiebert & Carpenter, 1992). In addition, understanding is one's ability to construct the meaning of instructional messages including oral, written, and graphical communications of any kind when presented in a classroom, book, or computer screen (Anderson, et al., 2001). The process of understanding is the process of building knowledge networks through reasoning, developing explanations, learning by example, linking with initial knowledge, and engaging in practical activities and intellectual activities (Sierspinska 1994).

Mathematical understanding is a network of representations made and related to mathematical concepts (Barmby, et al., 2007). It means that mathematical understanding is the ability to make the connection between mathematical facts and represent them. When students have mathematical connection and representation ability, then it can be expected the students master the aspects of understanding ability as proposed by Anderson, et al. (2001), they are able to interpreting, modelling, classifying, summarizing, comparing, and explaining. Meanwhile, inferred to Hiebert & Carpenter (1992), when mental representation of math is part of the representational network, one said understand mathematics. Therefore, the students understand mathematics if they can represent information or math problems in any other form. It is well known that some kind of math representation including mathematical model (mathematical equation), graph, table, sketch (figure, image), various diagram, for example Venn diagram, tree diagram, and others.

Mathematical understanding can be achieved even be improved through constructivism-based learning that requires students to be actively involved in solving mathematical problems (Carpenter & Lehrer, 1999; NCTM, 2000). Throughout learning process, teachers can assess and improve mathematical understanding, too, among others, through observing the student's faulty in doing math, looking at the relationships students make between symbols, and corresponding symbolic and referential procedures, looking at the relationship between symbolic procedures and informal problem-solving situations, and examine the relationships that are made between different symbolic systems (Hiebert & Carpenter, 1992). In addition, Pirie & Kieren (1994) proposed how to characterize the growth or mathematical understanding and how to represent it.

One of learning based constructivism is Problem-based learning (PBL) (Arends, 2004). Minarni (2013) described how PBL influence students' mathematical understanding, while Napitupulu, Suryadi, & Kusumah (2016) showed how PBL cultivated mathematical reasoning ability of upper secondary students. Meanwhile, joyful learning suggested by Puri (2014) is meaningful to integrate into PBL, so we call our developed learning approach as Joyful Problem-based Learning (JPBL). JPBL has proven effective in improving mathematical understanding (Minarni, Napitupulu, & Husein, 2016) and representation ability of 88 students distributed in Tebing Tinggi, Pematangsiantar City and Medan City (Minarni & Napitupulu, 2017).

## 3. Research Questions

The questions of the research are:

- (1) Whether MUA' Score of the students is higher in experiment class than it is in conventional one.
- (2) Whether the improvement of students' MUA in experiment class high enough.
- (3) How is the performance of the students in solving mathematical understanding problems? In which aspect of MUA the students faced difficulties and in which aspect they have mastered.

## 4. Research Method

Type of the research is experimental since this is the dissemination phase of our developmental research. The experiment conducted along April to June 2017. The population is public junior high school (PJHS) students in North Sumatera, Indonesia. There are 158 students from PJHS 1, 2, and PJHS 4 in District Deli Serdang, PJHS 17 and PJHS 22 in Medan City, included as samples.

The experimental class uses instruction materials based-on Joyful Problem-based Learning (JPBL), consisting teacher-guided book, students' math book and Students Activity Sheets (SAS). JPBL approach implemented in the experiment classroom. While, direct instruction as Conventional learning approach implemented in the conventional classroom. Topics that students studied are linear equation of two variables and Pythagorean rules which packed in Student Activity Sheet (SAS).

There are nine SAS given along all learning sequence. All students administered MUA test at the end of learning program. The students in JPBL classroom also take pre-test since we not only want to measure the difference of MUA achievement between the students in JPBL classroom and they are in conventional classroom but also interested in the improvement of students' MUA in JPBL classroom. The MUA test used is five items essay test with 70 minutes available time. The test was designed based on MUA aspects that modify from NCTM (2000), Anderson, et.al. (2001), and 2013-Curriculum (Depdikbud, 2013):

1. Create mathematical equation to solve the problem.
2. Propose an example and non-example of math concept.
3. Classify mathematical equation into proper group.
4. Create graph as an interpretation of the problem and explain the solution obtained.
5. Using similarity (analogy) to solve problems.

Three of essay post-test were presented in Appendix 1.

At the time of topic related to linear equation of two variables, learning process took place at mini bookstore and canteen in the school area so that the students learned to realize the real problem, were interested in mathematics and motivated to solve the problems at hands. Whenever the topic related to Pythagorean rule, they searched for triangle-shaped around the school. In this activity, teacher act as a couch.

As well as observation towards students' activity in solving problems and teacher activity in implementing JPBL, interview also conducted to both of them in order to enrich finding in qualitative data. Along with students' performance, both the students' difficulties and fluency in solving MUA problems are investigated through students' answer sheets. Scoring rubric of MUA test included in Appendix 2, while an example of Students Activity Sheets (SAS) presented in Appendix 3.

Score of MUA test analyze by t-Independent test, while result of observation and interview analyze descriptively.

**5. Results And Discussion**

*5.1 The Students' Score in MUA Test*

Result of mathematical understanding ability (MUA) test both in JPBL and in Conventional class is presented in Table 1.

Table 1. Average Score of MUA Post-test

Approach	N	Mean	Std. Deviation	Std. Error Mean
JPBL	158	12.66	2.271	.181
Conventional	158	7.00	1.184	.094

Note: Ideal score = 20

Table 1 shows that MUA score of the students in experiment (JPBL) class is higher than it is in conventional class. Result of t-independent test, presented in Appendix 4, shows that there is significant difference of MUA average score between the two classes. By referring to Table 2, the students' MUA achievement in the JPBL class is better than it is in conventional class. According to Glass & Hopkins (1996), it means treatment (JPBL) gives significant effect towards students' MUA. Standard deviation of the MUA scores is homogeny, meaning that there is no students get MUA scores far above average, whereas no student get scores far below average. The lowest score is 8 and the highest score is 17, just around the average score. Average score of MUA post-test at each school presented in Table 2.

Table 2. Average Score of MUA Post-test at Each School

School	Class	Average	SD	Sample size	Total
PJHS 1	Conventional	7.531	1.199	32	64
	JPBL	12.531	1.871	32	
PJHS 2	Conventional	7.290	0.923	31	62
	JPBL	12.452	2.353	31	
PJHS 4	Conventional	7.250	0.994	20	40
	JPBL	12.550	1.562	20	
PJHS 17	Conventional	6.249	1.249	35	70
	JPBL	12.771	2.587	35	
PJHS 22	Conventional	6.723	1.072	40	80
	JPBL	12.875	2.293	40	
Total					316

Note: Ideal score = 20

Table 2 shows that at every school, MUA average score of the students in JPBL class is also higher than it is in conventional one. Even though, some students still get low scores. Output of statistic test give significant result for these differences.

5.2 The Improvement of Mathematical Understanding Ability

The improvement of the students' MUA in the JPBL class calculated using Hake normalized gain index or N-gain, and presented in Table 3.

Table 3. N-gain of Students' MUA in JPBL Classroom

MUA Test	n	Mean	Std. Deviation	N-gain
Pre	158	7.00	1.184	0.283
Post	158	12.66	2.271	

Note: Ideal score = 20

According to Hake (1998), this gain belongs to medium category. Required implementation of constructivism-based learning more often, especially JPBL, so that problem-solving activities become a culture among PJHS students. Even, children should be encouraged early to involve in solving simple problems. Because in fact, since the baby, human being have confronted with the problem.

5.3 The Students' Performance in Solving MUA Problems

Result of MUA post-test classify into three category as presented in Table 4. The classification pointed out the performance category of students' performance in MUA test.

Table 4. The MUA Performance of the Students in JPBL classroom

Criteria	Performance	N
$MUA < 10.4$	Low	33
$10.4 \leq MUA < 14.9$	Mediocre	88
$MUA \geq 14.9$	High	37
Total	-	158

Note: Mediocre category:  $MUA \leq |\mu \pm \sigma|$ ;  $\mu = 12.66$ ;  $\sigma = 2.271$

Based on Table 4, there are 88 of 158 students belongs to mediocre category, 37 belongs to high category, and 33 of them (< 21%) belongs to low category. This is quite good, because understanding is a high-level thinking element well above the retrieval (Anderson, et. al., 2001; Marzano & Kendall, 2007; Minarni, Napitupulu, & Husein, 2016). Taxonomy of educational objective stated that retrieval is a product of memorization, while understanding skills is a product of connection, representation also reasoning. Someone use reasoning to connect one piece of information to others. Furthermore, students' performance can still improve because the age of students is in the phase of rapid cognitive development and basically all human being have capacity to learn in a rapid rate whenever he/she want it. Thus, mathematical understanding of the students is still developed. One other factor besides learning approach that give influence to the students' thinking development is the teacher belief. The teachers should believe their students are outstanding, and then they will be outstanding.

Joyful Problem-based learning make positive emotion since the students enjoy along learning activity, so that enable knowledge store in long term memory for long period and make it easier to apply in new and unfamiliar situations or problems. JPBL make the students fully engage in learning. Average number of students' engagement in learning activity attains more than 85%.

5.4 The Students Difficulty and Fluency in Solving MUA Problems

Investigation towards students' difficulty is important because it means the students could not answer the question or give wrong solution. According to Hiebert & Carpenter (1992), wrong solution or faulty the students proposed is one of a few way to improve mathematical understanding. In this part, the discussion and suggestion directed to the difficulties the students faced in solving MUA problems by referring to Statistic of Students' Post-test Result in Each Aspect of MUA presented in Appendix 5, and students' answer sheet. Along with the students' difficulties, we also observed the fluency they achieved in solving the problems. For these purpose, some examples of students answer sheet presented below.

a. PJHS 1

We can found in Appendix 5 that the students at PJHS 1 face difficulties in the 2<sup>nd</sup> and 4<sup>th</sup> aspects of MUA. The 2<sup>nd</sup> aspect is to propose example of gradient concept. The 4<sup>th</sup> aspect is to draw graph in order to aid him/her solve the problem and explain the solution obtained. An example of student' answer sheet showed his/her difficulty in 2<sup>nd</sup> aspect of MUA attached in Figure 1.

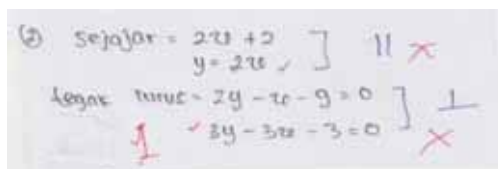


Figure 1. Student' Difficulty in 2<sup>nd</sup> Aspect of MUA

If the student in Figure 1 write  $y = 2x + 2$  instead of  $2x + 2$ , then it is true as an example of two parallel line. On the other side, example of line perpendicular to other line she/he proposed is wrong. It means, she/he has not understand line concept and the nature of gradient yet. Even, this shows he/she has difficulty in the process of retrieval knowledge from his/her cognitive structure. Therefore, the teacher should give more attention to this aspects by giving frequent problems elicited the ability of giving examples as well as non-example. We can found examples of such problems in NCTM (2000) as well as in many published scientific articles.

The students have fluent in the 1<sup>st</sup> and 3<sup>rd</sup> aspect of MUA, that is to create mathematical equation, and classify mathematical equation into proper group. Figure 2 clarifies the student fluency in 1<sup>st</sup> aspect of MUA.

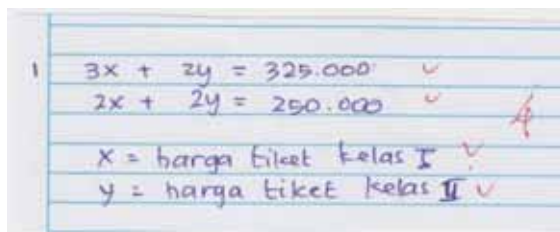


Figure 2. Student' Fluency in 1<sup>st</sup> Aspect of MUA

In Figure 2, the student create both correct mathematical equation for the problem and give correct explanation about each variable included in the equation. This student can represent real life problem in mathematical symbol. In other word, he has capable in making relationship between real life problem and math symbol. This capability is an aspect of mathematical understanding, as stated by Carpenter & Lehrer (1999). Overall, most of the students has capable in complete this task, a few number of them still enable.

b. PJHS 2

The difficulties of the students at PJHS 2 in solving MUA test are in the 4<sup>th</sup> and 5<sup>th</sup> MUA aspects. The 4<sup>th</sup> aspect is to draw graph in order to aid him/her solve the problem and explain the solution obtained, and 5<sup>th</sup> aspect is to use similarity (analogy) to solve the problem. Figure 3 expresses the work of the students experienced difficulty in the 4<sup>th</sup> aspect of the MUA.

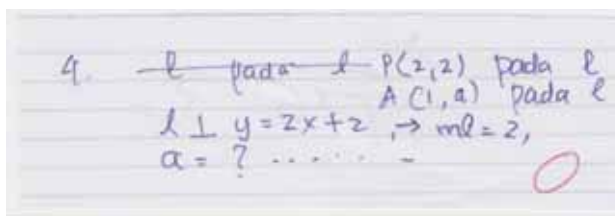


Figure 3. Student' Difficulty in 4<sup>th</sup> aspect of MUA

Researching students' performance in solving problems aimed at exposing students' abilities in the 4<sup>th</sup> aspect of the MUA, it appears that this student having difficulty. This student could not create a graph as requested. If he/she represent information in a graph, probably he/she would be easier to get a solution. One of the striking things about the observation results is that students avoid the activities of drawing to represent the problem. If confirmed to the interview results, this issue indicate that the students are not used to drawing, so rigidly when forced to make drawings/sketches on a situation or problem. While, it is clear that drawings or sketches are helpful to make problem clear and help to avoid misconceptions. Sketches/drawings/figure is useful representation. As implied from Carpenter & Lehrer (1999), representation is an element of understanding. Therefore, if one lack of mathematical representation then he/she could not acquires mathematical understanding.

The students at this school fluent in the 2<sup>nd</sup> and 3<sup>rd</sup> aspect of MUA, they are to create mathematical equation, and classify mathematical equation into proper group, such as linear equation of one variable, linear equation of two variables, or system of linear equation of two variables. One of the student' work showing fluency in 3<sup>rd</sup> aspect of MUA depicted in Figure 4.

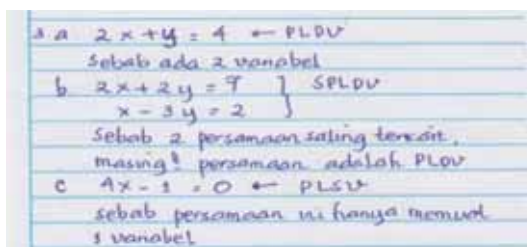


Figure 4. Student' Fluency in 3<sup>rd</sup> aspect of MUA

The performance of the student depicted in Figure 4 showed that he/she is fluent in solving MUA problem related to 3<sup>rd</sup> aspect of MUA. That is, he/she fully understands the concept of linear equations. Moreover, he/she is able to classify the types of linear equations to linear equation of one variable, linear equation of two random variable, and the system of linear equation of two variable, and give explanation. According to Marzano & Kendall (2007), this student has the ability to symbolize knowledge and integrate it into the knowledge already available in his cognitive structure. Explanation given by this student showing the characteristic of understanding (Sierspinska, 1994). Not many students can complete such MUA task.

c. PJHS 4

The students at PJHS 4 face difficulties in the 4<sup>th</sup> and 5<sup>th</sup> aspects of MUA. The 4<sup>th</sup> aspect is to draw graph in order to aid him/her solve the problem and explain the solution obtained, and 5<sup>th</sup> aspect is to use similarity (analogy) to solve the problem. Figure 5 depicted student' difficulty in completing 5<sup>th</sup> aspect of MUA.

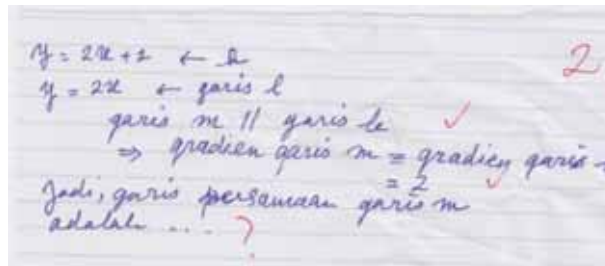


Figure 5. Student' Difficulty in 5<sup>th</sup> aspect of MUA

The student performance shown in Table 5 point out that he/she understands the gradient concept of a line, but does not yet understand the concept of two parallel lines. That is why after determine gradient of line, he/she stopped, could not complete this task anymore. When compared with observations, this student is inconsistently involved in discussions or solving problems with his friends in groups. Thus, it is hard for him to grasp full understanding in math topic learned.

The students at this school have mastered in the 2<sup>nd</sup> and 3<sup>rd</sup> aspect of MUA, that is to create mathematical equation, and classify mathematical equation into proper group. We give an example of student' performance in completing 2<sup>nd</sup> aspect of MUA task as presented in Figure 6.

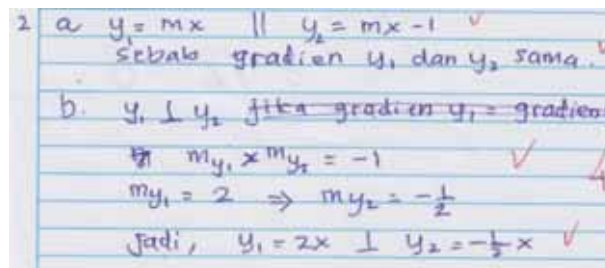


Figure 6. Student' Fluency in 2<sup>nd</sup> aspect of MUA

Performance of the student displayed in Figure 6 shows that he/she is fluent in giving an example of two parallel lines along with correct explanation as well as proposing example of two perpendicular lines. Observation results revealed that this student actively engage in group discussion to solve the problem, even, sometimes dominate the group.

d. PJHS 17

The second and 4<sup>th</sup> aspect of MUA are the difficulties aspects for the students at PJHS 17. Second aspect is to propose an example of gradient concept, and 4<sup>th</sup> aspect is to draw graph in order to aid him/her solve the problem and explain the solution obtained. Figure 7 shows the student' difficulty in solving 2<sup>nd</sup> aspect of MUA problem.

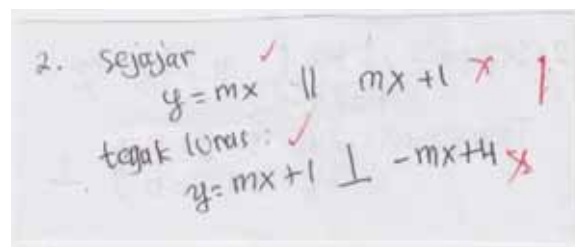


Figure 7. Student' Difficulty in 2<sup>nd</sup> aspect of MUA

The solution proposed by the student, almost correct. However, he/she did not write  $y = mx + 1$  parallel to  $y = mx$

instead of  $mx + 1$  parallel to  $y = mx$ . Result of interview to this student find out that in his mind ' $mx + 1$ ' is an equation, a line. The purpose is to avoid the repetition of writing the letter  $y$ . There is obstacle to declaring what he thinks in his mind. This shows that the concept of line equation has not been firmly entrenched in the cognitive structure of this student so it is not easy for him to retrieve that concept. According to Marzano & Kendall (2007), of course the process of retrieval knowledge is to use in problem solving.

The students at PJHS 17 fluent in the 1<sup>st</sup> and 3<sup>rd</sup> aspect of MUA, that is to create mathematical equation, and classify mathematical equation into proper group. Figure 8 clarifies that statement.

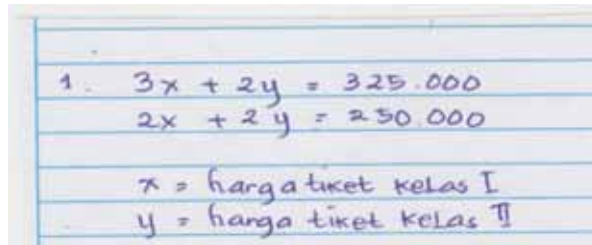


Figure 8. Student' Fluency in 1<sup>st</sup> aspect of MUA

Figure 8 shows that the student has the capability in creating mathematical equation and explaining the meaning of each variable included in the equation. Creating math equation for a problem is one kind of interpreting ability that is important aspect of MUA as stated by Anderson, et. al. (2001). Based on data in Appendix 5, the students at all school included in the research have fluent in this aspect of MUA.

e. PJHS 22

The students at PJHS 22 face difficulties in the 2<sup>nd</sup> and 4<sup>th</sup> of MUA aspects. The 4<sup>th</sup> aspect is to draw graph in order to aid him/her solve the problem and explain the solution obtained. Like the students at PJHS 2, the students at this school also do not like to make pictures. They always shy away from the task of making pictures. In drawing art lessons, Indonesian students generally only know to make two mountains flanking the sun that shines. It is rare that once a student stands out in the art of drawing.

The 2<sup>nd</sup> aspect is to explain the solution. Example of student difficulty in completing second aspect of MUA presented in Figure 9.

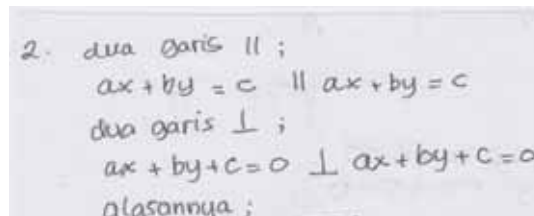


Figure 9. Student' Difficulty in 2<sup>nd</sup> aspect of MUA

What the student presented in Figure 9 shows that he/she know line equation as  $ax + by = 0$  and  $ax + by + c = 0$ . He/she wrote  $ax + by + c = 0$  perpendicular to  $ax + by + c = 0$ . In this case, he/she has not understand the concept of two lines perpendicular to each other yet. Obviously, many of students included in the research need more practice to acquire the concept of parallel as well as perpendicular line.

The students at PJHS 22 fluent in the 1<sup>st</sup> and 3<sup>rd</sup> aspect of MUA, that is to create mathematical equation, and classify mathematical equation into proper group, such as linear equation of one variable, linear equation of two variables, or system of linear equation of two variables. Figure 10 clarifies the student' fluency in completing 3<sup>rd</sup> aspect of MUA.

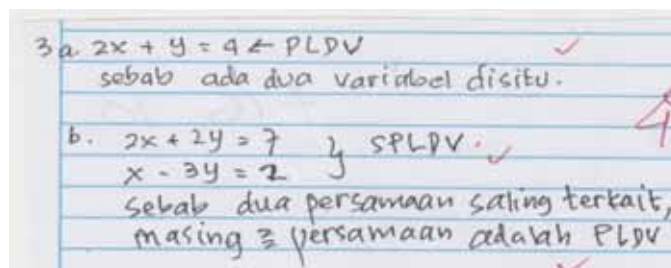


Figure 10. Student' Fluency in 3<sup>rd</sup> aspect of MUA

It can be seen in Figure 10 that this student understand enough what is linear equation of one variable, linear equation of two variables, and system of linear equation of two variables. In addition, he/she give true explanation for each

claimed he/she made.

Finally yet importantly, comparing to TIMSS (Mullis & Martin, 2012) and PISA (2012) report, MUA score of the students in District Deli Serdang and Medan City are quite good. Reported by Mullis & Martin, Indonesian students' score for problem solving is categorized low. While the results in this research, students achieve more than 62% even though the problems more complicated than PISA's or TIMSS'. The rationale for this is that students who take the test organized by TIMSS are students who learn through Conventional learning, while those who follow the test in this study are students who learn through joyful problem-based learning. Again, it indicated that joyful PBL is powerful in promoting students' mathematical problem solving. In this case, mathematical problem solving that emphasizes the capability to understand the problem and solve it.

In this study, JPBL gives significant impact due to the teacher is obedient in implementing JPBL and consistently used the syntax of JPBL. Furthermore, learning process took place not only in the classroom but also in the school garden and at mini bookstore in the school area. The teachers also always start learning activity by raising questions that arouse students' curiosity and motivated them to engage in group-discussion, and provided proportional scaffolding. Nevertheless, it seems that scaffolding is not sufficient if given in front of the class for all students. Scaffolding provided to group discussion, not to all of the students in the classroom because each group had different type of difficulties. However, if it done, the teacher's time and energy is not enough, even for a class of 20 students, around 5 groups. Thus, constructivism-based learning seems to be more powerful if implemented in classrooms with less than 20 students. Of course, it needs forward research to prove this prediction.

## 6. Conclusion

The research results are:

- (1) The average score of mathematical understanding test of the students in experiment classroom is higher than it is in Conventional class. It means, the achievement of students' MUA is better in JPBL class than it is in Conventional one.
- (2) The improvement of students' mathematical understanding ability in JPBL classroom belongs to medium category.
- (3) The students' performance in solving mathematical understanding problems is better in JPBL class than it is in Conventional one. The students faced difficulties both at the aspect of explaining the solution and giving examples of math concept. They do best at the aspect of creating mathematical equation.

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**Appendix 1: Post-test Problems**

1. For the 26<sup>th</sup> SEA Games soccer tournament in 2011 that took place in Palembang City, the committee provided tickets for Class I and Class II. Mr. X bought three Class I and two Class II for a total of 325,000 rupiahs. If you buy two pieces of class I and two pieces of class II, then you have to pay 250.000 rupiahs. Change the sentences above into algebraic form. Explain the meaning of each variable.
2. Write down two equations of parallel lines and two equations of perpendicular. Explain your answer.
3. Determine the following either a linear equation of one variable, or two variables, or a system of linear equation of two variables. Give explanation to each of your answer.

a.  $2x - y = 4$                       b.  $\begin{cases} x + 2y = 7 \\ x - 3y = 2 \end{cases}$                       c.  $4x - 1 = 0$

**Appendix 2: Scoring Rubric**

Holistic Analytic Marking Scheme for Math Understanding Test

Student performance	Mark
a. Understand the problem by represent it in sketch (image), graph, diagram, or table that can aid to solve the problem.	4
b. Knowing relevant concept to apply in solving problem	
c. Showing an aspect of mathematical understanding which is fit to the problem	
c. Complete operations that lead the correct answer.	
a. Understand the problem by represent it in the form that can aid to a correct answer if followed by an attempt to solve it.	3
b. Showing an aspect of mathematical understanding which is fit to the problem	
c. The solution included all of mathematical component in the problem	
d. Complete operation but not lead to the correct answer	
a. Understanding the problem by represent it in the form (sketch, graph, diagram, or table) that can aid to solve the problem.	2
b. Showing an aspect of mathematical understanding which is fit to the problem	
c. The solution not included all of mathematical component in the problem	
d. Incorrect answer due to computational error or error in writing mathematical component	
a. Understand the problem by represent it in the form that lead to correct answer.	1
b. Use incorrect concepts or procedures that lead to incorrect answer	
No answer at all or only rewrite the problem	0

Appendix 3: Example of Problems in Student Activity Sheet (SAS)

1.3 Properties of Gradient

**Problem 1**

Two roads in a City are in parallel position. The first street and the second street restricted by the row flower garden. Suppose the two road considered as two line that presented in Cartesian coordinate as line  $k$  and line  $l$  (see Figure 1). Find gradient of line  $k$  and the line  $l$ .

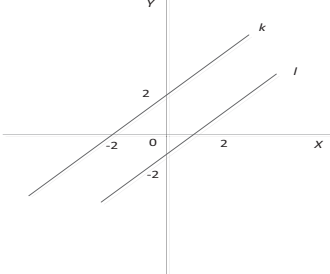


Figure 1

**Problem 2**

Look at Figure 2. Determine gradient of line  $k$  and line  $l$ . Are these two line perpendicular to each other? Explain your answer.

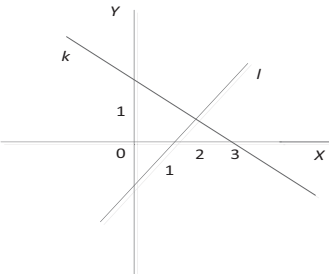


Figure 2

**Problem 3**

Determine gradient of line  $k$  and  $l$  on Figure 3.

- Can you see the relationship between gradient of line  $k$  and ordinate- $x$ ?
- State your opinion about that relationship.

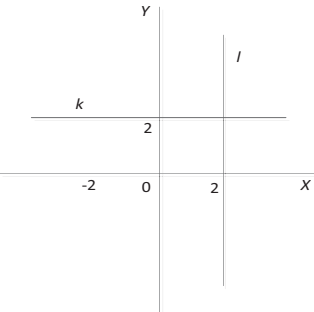


Figure 3

**Problem 4**

Please, put your attention to Figure 4. Let the equation of line  $k$  be  $y = -x$  and the equation of line  $l$  is  $y = x + 1$ . Determine the coordinates of point P.

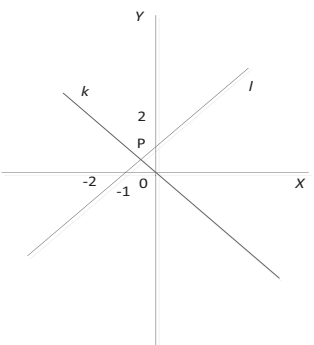


Figure 4

**Conclusion**

1. Gradient of two parallel line is. ....
2. The product of two gradient of two perpendicular line is. ....
3. Gradient of a line parallel to abscissa-X is. ....
4. Gradient of a line parallel to ordinate-Y is. ....



**Woow...finally.....  
I know math is easy.**

**Appendix 4:**

Output of t-Independent test for Equality of Means

MUA	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Equal variances assumed	.000	27.774	314	.000	5.658	.204
Equal variances not assumed		27.774	236.463	.000	5.658	.204

**Appendix 5:**

Statistic of Students' Post-test Result in JPBL Class at each Aspect of MUA

School	n	Aspect of MUA	Average	SD
PJHS 1	32	1	3.00	0.75
		2	1.97	0.769
		3	3.03	0.68
		4	1.78	0.69
		5	2.75	0.93
PJHS 2	32	1	2.74	0.91
		2	2.77	0.94
		3	2.96	0.82
		4	2.00	0.56
		5	1.80	0.69
PJHS 4	20	1	3.05	0.66
		2	3.20	0.67
		3	3.20	0.74
		4	1.55	0.66
		5	1.50	0.59
PJHS 17	35	1	2.91	0.73
		2	1.77	1.01
		3	3.14	0.72
		4	2.08	0.80
		5	2.85	1.14
PJHS 22	40	1	3.20	0.84
		2	2.05	0.97
		3	3.05	0.73
		4	2.22	0.79
		5	2.37	0.99
Total	158	-	-	-

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# Microfoundations of Organizational Routines and Capabilities on Demand of Designing Network Position through High Potential Acumen Leader on Absorptive Capacity

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Received: September 8, 2017      Accepted: September 22, 2017      Online Published: November 28, 2017  
doi:10.5539/ass.v13n12p97      URL: <https://doi.org/10.5539/ass.v13n12p97>

## Abstract

Extending to explore how organizational antecedents affect absorptive capacity, this research proposed a theoretical model linking microfoundations of organizational routines and capabilities with network effects through high potential acumen leader (H-PAL). Drawing on a network effects of network position perspective with design thinking to enhance absorptive capacity, I argue that organizational design become a determinant factors on firm to produce more innovation on yielding better performance if leader has significance potential to grow in both the greater scale and scope of promising management skills. Building upon the dynamic capabilities view of the firm, the paper proposed an advance model with design thinking approach convincing that the value of conceptualizing and operationalizing network effects of network position via high potential acumen leader have open up new research interest that cut across traditional “micro versus macro” boundaries.

**Keywords:** High potential acumen leader, microfoundations of organizational routines and capabilities, network position, and absorptive capacity

## 1. Introduction

In recent years a great deal of scholarly attention have witnessed a contribution of absorptive capacity in innovation (Tsai, 2001), business performance (Lane, Salk, & Lyles, 2001), interorganizational transfer of knowledge (Gupta & Govindarajan, 2000), and interorganizational learning (Lane et al., 2001; Lichtenthaler, 2009). Given increasing interest in absorptive capacity, few have captured the holistic of multi-dimensionality of the concept. Despite, while most studies have focused on innovation that lead to competitiveness of the firm via absorptive capacity, organizational management antecedents, particularly organizational design, have been largely ignored (Lane, Koka, & Pathak, 2006). Noticeable missing from research attention has been a potential of leadership, despite suggestions by creativity researchers that most scholars focus on greater effort on leadership approach rather than the potential level of such a leader.

In today's dynamic and increasingly hypercompetitive environment, firm aspire to achieve sustainability in their performance through frequent change, instead of rely on macrofoundations of organizational strategy and execution, microfoundations of organizational routines and capabilities is required. Felin, Foss, Heimeriks, & Madsen (2012) realized that routines and capabilities have emerged as a central constructs in all field of management research. Particularly, it has also been closely linked to the interorganizational knowledge-based assimilation and transformation. Despite much progress has been made in understanding routines and capabilities, the interlinking microfoundations of these constructs have not received adequate attention (Felin et al., 2012).

The research proceeds as following; proposed a contemporary leadership paradigm that extending transformational leadership to high potential acumen leadership, integrating design thinking approach in complementary for leader to architect processes and structural fit with its organizational members to enhance their network effects of network position on recognizing and transforming valuable external knowledge to best interest of organization. Finally, the purpose is to enhance absorptive capacity to achieve frequent innovation to promote sustainable growth.

## 2. Literature Review

New Leadership Approach on Enhancing Microfoundations of Organizational Routines and Capabilities: High Potential Acumen Leader (H-PAL)

Over the last two decades, we have witnessed a clear consensus that transformational leadership represents the most active and effective form of leadership, a form in which leaders are closely engaged with follower and motivating them to outperform their potential. Bass (1985, 1990, 1999) has theorized that transformational leadership comprises of four dimensions, intellectual stimulation, individualized consideration, idealized influence, and inspirational stimulation. All these capabilities relate directly to enhance firms encounter the difficulty by motivating employee to invest more on their work.

**Microfoundations of Organizational Routines and Capabilities**

Cognition, action, and interaction within organization have presented as a central constructs in a field of management research. As recent growing body of research are highly influenced by innovation. Microfoundations of organizational competitiveness have drawn heightened attention form scholars and others (Lichtenthaler, 2009, Lewin, Massini, & Peeters, 2011). The concept of microfoundations certainly is not new. It traditionally rest on sociology and philosophy in social theory, whereas early work used as a factor to explain organizational heterogeneity (Gavetti, 2005). Therefore, microfoundations of organizational routines and capabilities, specifically, referred to individuals, processes, structure, and interactions within and across components that contribute to the aggregation and emergence of the collective constructs (Felin et al., 2012).

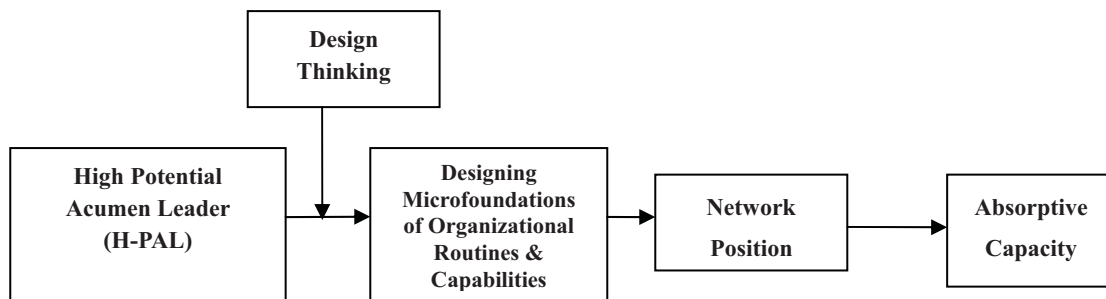
**Design Thinking on Linking High Potential Acumen Leader (H-PAL) and Microfoundations of Organizational Routines and Capabilities**

**Shifting from Transformational leader to High Potential Acumen Leader**

Over the last two decades, we have witnessed a clear consensus that transformational leadership represents the most active and effective form of leadership, a form in which leaders are closely engaged with follower and motivating them to outperform their potential. Bass (1990) introduced transformational leadership concept for more than two decade. However, the majority of related leadership research has limited to three broad categories: non-transactional, transactional, and transformational. These categories describe leader behavior performance from passive-ineffective to active-effective (Avolio, 1999). Despite such existing leadership evidence that matters, researchers still need to know more about how leader cope with holistic dynamic change to produce upward mobility by influence each individuals and units in the workplace.

Across all three categories of leadership are characterized by the latitude of behavior characteristics. As Rubin, Munz, & Bommer (2005) noted, transformational leader represents the most active and effective form in which leaders are effectively engage with the subordinates and motivate them to outperform their tasks and responsibilities. In addition, Poddakoff, MacKenzie, Moorman, & Fetter (1990) described conceptualization of transformational leadership characteristics which included; articulating a vision of the future, fostering group-oriented work, setting high expectations, challenging followers’ thinking, supporting followers’ individual needs, and acting as a role model.

**Proposed Model**



Theoretically, transformational leadership influences their subordinates by “broadening and elevating follower’s goals and providing them with confidence to perform beyond the expectations specified in the implicit or explicit exchange agreement” (Dvir, Eden, Avolio, & Shamir, 2002: 735). With respect to original personality traits and transformational leadership behaviors, one initial step forward explanation for those evidences support should be a leadership potential of designing management frameworks rather than emotional stability as usual. Thus, this paper take an initial step toward addressing this conspicuous oversight of a transformational leadership from Bass (1985) original concept which theorized that transformational leadership comprises four dimensions: intellectual stimulation, individualized consideration, charisma, and inspirational motivation.

**High Potential Acumen Leader (H-PAL)**

The extent studies indicated that narrowing leadership characteristic may be limited the usefulness of leadership capabilities. Therefore, a contemporary leadership discipline should shift its focus from leadership latitude or lateral abilities to longitude or vertical abilities to what extent define by leadership potential level.

One most business challenge is to ensure that firms ready to prepare “high potential” personnel that firms believe with trust that will become leaders. Setting a clear definition of “high potential leader” that mean someone will be able to succeed in a significant in bigger impact through their own ability to responsible greater scale and scope (Groysberg & Nohria, 2011). Thus, high potential acumen leader (H-PAL) is proposed. Whereas, high potential acumen leader is defines an extension of transformational leader with special attention to an overall potential to design individuals to fit with processes an interactions in suitable architect structure on enhancing better organizational routines and capabilities that be able to coup with current intense competitive market to ensure sustainable growth.

In sum, the alternative propose of new strategic leadership paradigm become an essential, whereas competitions are

highly dynamic. The great insight was that firms compete not only with their direct rivals but also with their customer on creating more value and mutual benefits (Gavetti, 2011). To complete the mission, the entire value-chain activities must be proactively functional smartly. High potential acumen leader (H-PAL) is considered in the context of executing leading superior performance through their shrewdness of deriving insight. The proposed high potential acumen leader (H-PAL) might not only affect the development, operation, maintenance, and/or change of routines or capabilities, but also contribute to creativity capabilities (Vergne and Durand, 2010).

Establishment concept of acumen leader describe as one that has ability to make a good business judgement and quick decision, typically in a socio-economic benefits of the firm. A basic characteristics for assessing high acumen leadership potential extend from transformational leader are as follow; high power of associate thinking, derives insight, strongly influence collective organizational engagement, and leading congruence organizational direction. Proposing a new psychology of leadership is an attempt to make enormous progress and great strides poverty in order to lift up a quality and a standard of living of mankind through well-designed management in business activities for the next decades (Gavetti, 2011).

### **Design Thinking**

Interest in how the application and practice of design might contribute to management and business is increasing exponentially. Empirically, there are variations within the theme, such as how design thinking might enrich strategic thinking, or how using common concepts in design practice can infuses a design of business practice (Martin, 2009). In this article, design thinking refers to the ability of leader to create appropriate processes, methods, approaches, structure, system and solutions that intelligence enough to ensure creative action (Brown, 2008, Martin, 2009). Moving beyond prior research by linking business leader and design thinking deserves an attention of researcher because thinking like a designer offers a way of framing management that go beyond pursuit of efficiency and help to ensure organizational innovation. Moreover, this allows us to separate theoretically and practically the influences of leadership and organizational performance.

### **High Potential Acumen Leader (H-PAL) on Design Thinking Microfoundations of Organizational Routines and Capabilities**

Indeed, this study described how high potential acumen leader (H-PAL) design his thinking that offers a way of framing microfoundations affect routines and capabilities of firms. This article follows a working definition of microfoundations of organizational routines and capabilities which include constituent components (i.e. main effects)-individuals, processes, and structure; and interactions within and across components (i.e. interaction effects)-the interactions of individuals, processes, and structures that contribute to the aggregation and emergence of the collective constructs (Felin, et. al.,2012: 1353). To describe a different way of design thinking, which would be a value of high potential acumen leader effectiveness would be reasonable to harness information, understanding, and managing emotional information in followers' thinking. Indeed, managing micro-level phenomena, specifically, individual, processes, and structure that have been played a central role in the origins of management theory, is required a correct path.

A complementary body of microfoundations lay as an important cause of emergence mechanism of processes and structure, particularly their interactions, through individual interest to absorb new external knowledge (Felin, et. al., 2012, Hodgson, 2012). Despite, the growing interest in microfoundations of organizational routines and capabilities, the lack of research regarding this issues with leadership potential have been largely ignored. The emphasis of this paper is placed on how leaders can influence their follower to interact effectively on a design thinking processes and structure on routines basis with relatively high attention on outperforming innovative task.

Even though, routine tasks establish automatic patterns of behavior, increasing task understanding and enriching organizational effectiveness required well-designed process, structure and its interaction. Therefore, high potential acumen leader (H-PAL) tentatively become the appropriate predictable variable that enable microfoundations absorptive capacity mechanism. In addition, high potential acumen leader with a high level of design thinking is likely to hamper the ability to design microfoundations factors ready for future innovation.

Proposition 1: High potential acumen leader will influence the well-designed microfoundations of organizational routines and capabilities on well-practice interaction for valuing new external knowledge for future innovation development.

Proposition 1a: Design thinking of high potential acumen leader mediates the effect of high potential leader acumen leader on well-designed for well-practice of microfoundations of organizational routines and capabilities.

#### *Microfoundations of Organizational routines and capabilities and Network Effects of Network Position*

While organizational routines and capabilities are theoretical linked with social network, these constructs may vary in multiple manifestations and focus on different phenomena. One implication of this heterogeneity is that many aspects of routines and capabilities require further explanation. Drawing on a network perspective on microfoundations of organizational routines and capabilities, one can argued that design organizational routines can enhance innovation toward better performance, if leader acknowledge network position of each organizational units recognizing and reveals its ability to acquire new external knowledge (Van de Ven, 1986). As Szulanski (1996) argued that without a

unit's tie relationship, knowledge is hardly transfers to others unit within an organization. In addition, prior research on knowledge-based view of the firm has suggested that social networks facilitate the creation of new knowledge within organizations (e.g. Kogut & Sander, 1992; Tsai, 2000). Therefore, social networks analyses can be partitioned into a number of conceptual and analytical categories in the proposed model.

Despite, networks effect and microfoundations of organizational routines and capabilities are particularly important in the study of organization management, the roles and responsibility defines the pattern of relationship and interactions that exist among actors in the processes have been surprisingly ignored. Social network methods are a mean of formally stating social properties and processes and rigorously defining management constructs, particularly on microfoundations of organizational routines and capabilities (Freeman, 1979).

Specifically, with an effective communication technology, it has been influenced the patterns of relationship that share engagement among each units in network significantly through designed network position. In which different network positions represent different opportunities of a unit to access new knowledge that is critical to create innovation (Tsai, 2001). Thus, the purpose of this study attempts to explore and to investigate the relationships between well-designed routines and capabilities at the micro-origins and the network effects through network position that has been directed by high potential acumen leader, particularly on design thinking approach.

Working on the behavioral theory of the firm directs attention to a potential a role of individuals in social network in explaining organizational outcomes. Indeed, Simon (1985) noted that research that linked these two concepts considerably ignore, particularly less focused on linking individuals' interest and cognitions to organizations' action on absorbing new external knowledge. The notion of bounded rationality serves as one starting point for new research contributions to leverage organizational learning (Lichtenthaler, 2009). Therefore, design thinking microfoundations of organizational routines and capabilities can enable units of different network position to gain access to new knowledge. That is essential to create new innovative products and services.

Proposition 2: Design thinking of microfoundations of organizational routines and capabilities is consistent with network effects of network position to access new knowledge.

### **Network Position and Absorptive Capacity**

In recent year researchers have used external knowledge to foster innovation and to enhance their performance (Zollo, Reumer, & Singh, 2002). Lichtenthaler (2009) noted that developing new innovation depend on the ability to absorb knowledge of the firms. Prior research has drawn heightened attention from scholar and others. In particular, Cohen and Levinthal (1990) attempted to examine those capabilities and introduced absorptive capacity for more than two decades. From their seminal papers, which has been termed absorptive capacity. In response to the attention given to absorptive capacity, researchers have address various concepts associated with the emergence and implications of comprehensive absorptive capacity. This article addresses absorptive capacity as a firm's ability to utilize external knowledge through the sequential dimensions and processes on recognition, acquisition, assimilation, transformation, and exploitation (Cohen & Levinthal, 1990, 1994, Zahra & George, 2002, Lane, Koka, & Pathak, 2006).

Exploratory learning, via recognizing, is considered as a starting point of learning through the establishment of acquiring external knowledge, and transforming acquired knowledge with their prior related knowledge in order to exploit it effectively on innovative matter (Zara & George, 2002). Therefore, exploitative learning relates to both acquired knowledge and stock knowledge on ability of organizational members to perform tasks on routinely basis. The increased use of mutual learning and interunit cooperation is consistent with well-designed strong network effected through network position which promote organizational units and its members to work as a teams with a good interpersonal skills that be able to process and transfers complexity information and knowledge to new creative ideas.

Zahra & George (2002) noted that knowledge recognition, transformation, and exploitation required sharing of relevant knowledge among members of the firm. Therefore, energizing multiunit within an organization to gain useful knowledge from each other is not only enhance firm to acquire more new external knowledge, but also provides opportunities to stimulate interunit to gain useful knowledge to enhance innovation (e.g., Kogut & Zander, 1992; Tsai & Ghoshal, 1998). Designing social networks through network position is likely to facilitate a creation of new knowledge within organization. Through different design network position, which depends on a potential of leader, represent a unit potential to connect to one another on recognizing and acquiring new external knowledge (Huber, 1991; Tsai, 2001). Therefore, firm that apply social networks interaction through design thinking network position will fuel strong connectedness on facilitating the flow of knowledge that allowing firm to assimilate, transform and exploit new knowledge for creative output. These observations suggest as the following:

Proposition 3: Applying network effects of network position are likely to enhance firm absorptive capacity, thereby the ability to create innovation is convincing.

### **3. Conclusion and Practical Implications**

The paper provides the complementarity of learning processes through a role of new leadership approach on design thinking. High potential acumen leader is proposed along with comprehensive attention on designing microfoundations of organizational routines and capabilities with network effects of network position. The purpose is to explore an effective influence pattern to enhance absorptive capacity via high potential acumen leader. Regarding the proposed

model, increasing exploratory, transformative, and exploitative of the firms via absorptive capacity requires the comprehensive design thinking on individuals, processes, structure, and their interaction. To actively increase absorptive capacity firm need to create an effective contextual antecedents that have significant influence on the emergence, operation, and effectiveness of high potential acumen leader.

From an antecedent perspective, it is clear that the design thinking capability of high potential acumen leader provide a significant form on organizing microfoundations of organizational routines and capabilities that draw on broadly accumulated knowledge within the domain of human capital, organizational capital and social capital. Thus, it would be reasonable to assume that while the antecedents of network effects of network position are likely to be somewhat reveals organizational ability relative strength in gaining access to new knowledge and leveraging useful knowledge proactively. Exploring new association path between leader and absorptive capacity through social networks is critical, particularly, when social network technologies can create strong network effects. Investigating design thinking on network position will provides useful information learning potential of its units on absorptive capacity on influencing the evolutionary path on an entire organization. As a starting point of developing such a mid-range theories on integrating macro-microfoundations of organizational routines and capabilities, pursuing this path of seeking will shed the light in a black box that has great potential to make significant contributions to management research.

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# Levels of Marital Satisfaction and its Relation to Some Variables on a Sample of Women in Amman City / Jordan

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Received: September 11, 2017

Accepted: October 11, 2017

Online Published: November 28, 2017

doi:10.5539/ass.v13n12p103

URL: <https://doi.org/10.5539/ass.v13n12p103>

## Abstract

The present study aimed to identify the level of marital satisfaction among a sample of women in Amman city / Jordan, and its relation to some variables, The sample included 165 women, it was randomly selected, the researcher designed a questionnaire that measures the level of marital satisfaction, which included 20 paragraphs, each paragraph measures one dimension related to marital satisfaction, The questionnaire was applied by the study members, The statistical analysis showed: 1- The level of marital satisfaction for all members of the study was medium level of marital satisfaction. 2- No statistically significant differences in marital satisfaction due to the variable number of years of marriage. 3- No statistically significant differences in marital satisfaction due to the variable number of children. 4- No statistically significant differences in the levels of marital satisfaction between working and non-working women. 5- There are statistically significant differences in marital satisfaction due to the variable educational level of women. 6- There are statistically significant differences in marital satisfaction due to the variable family income. This is a logical consequence of the nature of the study community.

The study recommended providing preventive counseling services for young men and women before marriage, and provide counseling services for couples about mechanisms of effective marital interaction, in order to reduce the risk factors leading to marital failure.

**Keywords:** Marital satisfaction, women, counseling services.

## 1. Introduction

The marital relationship is the foundation upon which societies are based, The relationship is also an important link across many cultures, The marital relationship is associated with family structure, the state of stability in marital relations is linked to marital satisfaction, this led to creation of healthy families whose members are in a state of positive interaction, as a normal result of health households, social construction will enjoy high quality and stability.

Both Carandang & Guda (2015) pointed that is marriage is generally defined as “a social contract between two individuals that unites their lives legally, economically, and emotionally” that gives legitimacy to relations within the marriage. It may also refer to the union between people, socially, and economically. Marital success is the goal and dream of every couple upon entering the married life though such is a real challenge. Thus, considering several vital factors contributing to it and gaining knowledge on how to build a strong and successful marital relationship are good starting points to achieve such goal.

Marital satisfaction is gaining increasing concern in modern society, The theory argues that people have multiple goals to achieve in their marriage. These marital goals can be classified into three categories: personal growth goals, companionship goals, and instrumental goals. The priority of the three types of marital goals is under dynamic changes across adulthood. Generally speaking, young couples emphasize the personal growth goals, middle - aged couples prioritize the instrumental goals, and old couples focus on the companionship goals. Whether the prioritized marital goals are achieved in marriage determines marital satisfaction. Other factors influencing marital satisfaction can be linked with marital goals in two ways. Some factors, such as life transitions and cultural values, can affect the priority of different marital goals; while other factors, such as communication pattern, solving problem, and attribution, can facilitate the achievement of the prioritized marital goals (Tianyuan & Helene, 2011)

Quality of the marital relationship is an important determinant of parenting experiences in families with typically developing sons or daughters. Parents in the general population who are in well-functioning marital relationships report less parenting stress than parents in poorly functioning marital relationships. Researchers have also shown that the marital relationship “spills over” into the parent child relationship. Parents who have better quality marital relationships report better quality parent-child relationships; there is some evidence that this spillover may be particularly true for fathers. Mothers and fathers who are dissatisfied with their marriage report more parenting burden or stress than those who are satisfied with their marriage (Hartley et al, 2011)

Marriage has dimensions related to the personal level such as: feelings, communication and solving problem. Marriage also related to the social level, including the relationship with children, in addition there are impact of marriage on the

economic level and the legal aspect, Accordingly, researchers in this field sought to study marital satisfaction and to identify some relevant variables, literature review shows that.

**The importance of this study:** The study was based on identifying marital satisfaction levels on a sample of women in Amman/Jordan, Where the statistical results in Jordan showed that divorce rates are increasing than in the past, resulting in many risk factors that threaten the cohesion and stability of society, and marital satisfaction is very important in the couples life, because its reflexes Adaptation, growth and sustainability of relationship, and maybe affecting on the transaction between family members, marital satisfaction helps husbands and wives to solve their problems effectively, and therefore this study is very important for considerations related to community culture, and the social context.

**Purpose of the study:** The study aimed to identify the levels of marital satisfaction on a sample of women in Amman / Jordan, and to identify the effect of some variables on the level of marital satisfaction, and identify risk factors threatened by the stability of the marital relationship, The study aims to answer the following questions:

## 2. Study Questions

- 1-What is the level of marital satisfaction on a sample of women in Amman city/Jordan?
- 2- Are there statistically significant differences ( $\alpha=0.05$ ) in the level of marital satisfaction due to the variable number of years of marriage?
- 3-Are there differences of statistical significance ( $\alpha=0.05$ ) in the level of marital satisfaction due to the variable number of children?
- 4-Is there a statistically significant ( $\alpha=0.05$ ) relationship between the work of women and their marital satisfaction?
- 5-Are there differences of statistical significance ( $\alpha=0.05$ ) in the level of marital satisfaction due to the variable educational level of women?
- 6-Are there differences of statistical significance ( $\alpha=0.05$ ) in the level of marital satisfaction due to the variable income of the family?

**The sample of this study:** included 166 randomized sample women from the city of Amman, in Jordan.

## 3. Literature

A review of the literature of social and psychological researches shows that there are many studies that dealt with the subject of marital satisfaction, with differences in the study communities and the form of samples and variables that have been studied, this indicates the importance of the subject of marital satisfaction and its general impact across different cultures, following are some studies that dealt with the subject of marital satisfaction:

Carandang & Goda (2015) prepared a study about marital satisfaction was used the Sternberg scale to measure levels of love and this is done by measuring the personal relationship, feelings and commitment of Batangas city. The survey method was by using the questionnaires and the spouse satisfaction index, and the number of respondents was 400 pairs. The results of the correlation analysis showed a positive correlation between the level of intimate relationship and the marital satisfaction of both males and females. The study showed significant differences in the level of intimacy between males by age of marriage and job status. For women, the results showed both the level of education and employment are related with levels of marital satisfaction.

On the other hand there is a Study by Abbasi & Afsharinia (2015) aimed to identifying the relationship between the patterns of communication at couples and the level of withdrawal and their relation to marital satisfaction was completed. The sample of the study included 30 pairs of students at the Kermanshah University where the marital satisfaction questionnaire (CPQ) and (ENRICH) was applied and the Coefficient of honesty and consistency was extracted of the scales, the Pearson correlation coefficient was used to analyze the data, while the data was analyzed by SPSS software. The results showed that the highest correlation in the mutual constructive relationship and marital satisfaction among women did not show the pattern of call / pull relationship any relation to marital satisfaction, and the results showed a negative correlation between marital satisfaction and mutual contact. Men and women had similar results.

Dabone (2014) finished study about Marital Satisfaction, aimed to know the impact of age on the level of marital satisfaction in the Municipality of the Brong - Ahafo Region of Ghana. The researcher used descriptive survey design as a research framework for the study. The study sample included 320 couples. Methodology was based on the formulation of a single research and hypothesis question. Data were collected from respondents by using the marital satisfaction list (MSI). Statistical analysis showed that both young and old married in the municipality are dissatisfied with their marriage. With a higher level of marital satisfaction for older persons compared to young persons. The study recommended the provision of counseling services for young people.

The study by Rebello et al. (2014) aimed to identifying the idea of couples about their marital relations, and specifically evaluating the marital relationship of 100 couples in Brazil. The tool of this study : Marriage and Relationship Questionnaire (MARQ). The results of the study showed that 86% of those living together for 12.62 Year on average are satisfied with their marital relationship, and that associated with the level of jealousy, partnership and love to be the most relevant factors of marital satisfaction.

In a study to investigate the impact of personal dimensions and their impact on marital satisfaction, Javanmard & Garegozlo (2014) conducted a study to identify the relationship of personality exclusion (neuroticism, extraversion, openness, agreeableness and conscientiousness) and marital satisfaction. With 35 men and 35 women, the research methodology was based on the descriptive approach. The study used NEO Five Factor Inventory (NEO-FFI) and Marital Satisfaction Inventory (ENRICH). The results of this study showed that neuroticism leads to marital dissatisfaction.

The study of Villa & Prette (2013) in Brazil aimed to identifying the social skills of couples through the application of the social skills scale (MSSI-Villa&Del-Prette) and Social Skills Inventory (SSI-Del-Prette), the study sample included a total of 406 married men, 188 men and 218 women. The study showed a relationship between marital satisfaction and social skills. Self-control and empathy were found to be related to marital satisfaction of men, conversation, expression and empathy related to marital satisfaction of women. This indicates gender differences regarding the importance of social skills and marital relationship.

In a study limited of women, Yadalijamaloye et al (2013) Conducted study aimed to explore the relationship between self-esteem and marital satisfaction in two cities in Iran. The sample included 757 women. 381 women in Najafabad and 376 in Fuladshahr married for at least 3 years. The results showed a relationship between the age of women and the duration of marriage on the marital satisfaction, the number of children, the duration of marriage, self-esteem and age can be predicted satisfactorily in Najaf, the number of children and self-esteem can explain marital satisfaction among women in Fuladshahr.

Bloch et al (2013) studied marital satisfaction through a longitudinal sequential study, which lasted for 13 years. age of the study sample was middle age (40-50 years) and the adult (60-70 years), who continued their marriage for many years. The study aimed at determining the methods of reducing the indicators of negative feelings after the negative events between the spouses, data analysis was performed using correlation models. The results of the study showed a decrease in negative behavior among wives with time progressing, and increase in the level of marital satisfaction, a decrease in negative behavior and use of constructive communication.

A study based on demographic variables, Zainah et al (2012) finish this study about marital satisfaction, The study was designed to determine differences in marital satisfaction based on demographic variables. The sample included 423 married couples. The Enrich scale was used to measure marital satisfaction. Statistical analysis showed statistically significant differences in the level of marital satisfaction based on the number of years of marriage and family income, The study pointed out the importance of providing marital counseling services in increasing the level of marital happiness.

**4. Method**

**Tool:** marital satisfaction scale, built after a review of the theoretical literature and previous studies on the subject of marital satisfaction, scale included 20 items, the scale items Reflect Networking, support and participation between spouses, Ranging answer on the scale items between 1-5 and 1 to indicate a very low degree, 2 indicate to a few degrees, 3 indicate middle, 4 refers to a large degree, 5 indicate to a very large degree.

To calculate scores, Calculated according to the following equation:

$$\frac{\text{Highest rate} - \text{Minimum}}{\text{Levels}} = \frac{5-1}{3} = 1.33$$

Fifth Likert Scale and descriptive analysis of Response show the average between (1-2.33) Indicates a low level, (2.34-3.66) indicates an average level. (3.67 - 5) indicates a high level.

**Factor Validity:** In order to study the Factor Validity of the scale as a whole, the analysis of the data generated from the application was conducted on the sample of the study. By extracting the main components and circulating them on vertical axes. The following table shows these results:

Table 1. The underlying roots of the first four factors explain performance on the scale of marital satisfaction

Factor	The underlying root	Explanatory Variance%	Cumulative Explanatory Variance %
1	9.754	48.768	48.768
2	1.396	6.978	55.746
3	1.111	5.556	61.302
4	1.021	5.103	66.405

The results of Table (1) indicate that there are four factors whose Eigen Value exceed (1). A total of (66.405%) of the variance, The root value of the first factor (9.754) was explained by (48.768%) of the variance in the scores on marital satisfaction While the Eigen Value of the second factor (1.396) was interpreted as (6.978%) of the variation in performance on the scale of marital satisfaction, The value of the Eigen Value was (1.111) and was interpreted as (5.556%) of the variance, The last factor was the value of the Eigen Value (1.021) and explained by (5.103%), To verify global truth, the first Eigen Value was divided on the second Engen Value (9.754 / 1.396) and the value (6.99) was greater than (2) which clearly indicates that there is one general factor that explains most of the variation of the

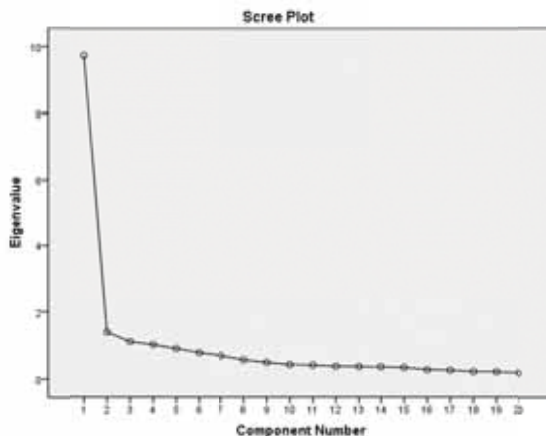
scale, Table (2) shows the saturation of the four-parameter vertex in the varimax vertical axis.

Table 2. The vertex saturation values were evaluated by the five factors obtained by the varimax vertical axis of the marital satisfaction measure

Paragraphs.	First factor	Second factor	Third factor	Fourth factor
1	.701			
2	.774			
3	.782			
4	.639			
5				.588
6			.784	
7			.710	
8				.778
9		.486		
10				.658
11	.555			
12			.473	
13			.430	
14			.610	
15		.633		
16		.539		
17		.643		
18		.646		
19		.770		
20		.691		

Table (2) shows that the paragraphs are saturated in one factor and this indicates a common factor that explains the variation in scores on the marital satisfaction scale

The paragraphs are distributed below:



**Construction Validity:** Construction Validity was verified by extracting the correlation coefficient of the paragraph with the total score of the marital satisfaction scale and the following table between these results:

Table 3. The correlation coefficients of the paragraphs with the total score of the marital satisfaction measure

Number Paragraph	Coefficient of correlation	Number Paragraph	Coefficient of correlation
1	.706	11	.717
2	.725	12	.646
3	.727	13	.682
4	.748	14	.566
5	.685	15	.707
6	.561	16	.734
7	.660	17	.633
8	.503	18	.629
9	.683	19	.615
10	.533	20	.635

Table (3) shows that the correlation coefficients of the paragraph by the overall degree of the marital satisfaction measure were all greater than (0.3). The correlation coefficients ranged between (0.503 and 0.748) and high values and indicate the construction accuracy of the scale.

**Stability of the scale:** The stability of the scale was verified by applying the scale to the sample of the study and the internal consistency coefficient was extracted using the Cronbach alpha formula. The value of the stability coefficient was  $\alpha$  (0.942), which is high and indicates the stability of the scale.

**5. Results**

Marital satisfaction questionnaire was applied by the study members, After completion of the application process, Data were released for statistical analysis purposes, use the statistical analysis program Statistical Package for the Social Sciences (SPSS) to analyze statistical data and answer the study questions, The statistical analysis showed the following results:

1-Results related to the first question: What is the level of marital satisfaction on a sample of women in Amman city/Jordan?

To answer this question, the averages, standard deviations and marital satisfaction were extracted on a sample of women. The following table shows these results:

Table (4) shows that the averages of the total score of the marital satisfaction measure was 3.32 and the average marital satisfaction level, while the averages for the paragraphs ranged between 2.77 and 3.85. And it show medium and high levels, where the paragraph (get my husband's sympathy with me when I get sick) ranked first with the highest mean (3.54) and high marital satisfaction. While the paragraph (My husband helps me in the housework) show last with the lowest average (2.77) and the level of marital satisfaction average.

Table 4. The averages, standard deviations and the level of marital satisfaction on a sample of women are arranged in descending order

Rank	number	The phrase	average	standard deviation	Degree of direction
1	13	I get my husband's sympathy with me when I get sick	3.85	1.138	High
2	1	I feel comfortable with my relationship with my husband	3.73	1.044	High
3	2	Understanding is the basis of the dealings between me and my husband	3.65	1.070	Medium
4	3	My personal relationship with my husband is warm	3.55	1.009	Medium
5	20	My husband appreciates the work I do	3.54	1.145	Medium
6	7	My husband supports me with my relationships with my family	3.53	1.068	Medium
7	4	My relationship with my husband achieved social support	3.43	1.049	Medium
8	11	My relationship with my husband is more peaceful than the conflict	3.43	1.072	Medium
9	15	I touch the state of constant tolerance by my husband	3.35	1.102	Medium
10	5	I progress socially / professionally as a result of my husband's support for me	3.31	1.130	Medium
11	16	The most support I get in my social relationships is my husband's support	3.30	1.171	Medium
12	19	I find that my husband has qualities that fill the gaps that I suffer from	3.26	1.140	Medium
13	17	When my husband and I disagree, we resort to dialogue	3.19	1.131	Medium
14	9	My husband and I often agree on the way children are treated	3.17	1.069	Medium
15	18	My husband and I exchanged courtesy	3.12	1.121	Medium
16	12	My husband looks like a lot of things to me	3.10	1.043	Medium
17	6	My husband encourages me to strengthen my relationships with my friends	3.09	1.109	Medium
18	10	I share with my husband recreational activities	3.05	1.298	Medium
19	14	My husband deals positively if I make a mistake	2.88	1.237	Medium
20	8	My husband helps me in the housework	2.77	1.333	Medium
The overall average of marital satisfaction measure					

2-Results related to the second question: Are there statistically significant differences ( $\alpha=0.05$ ) on the level of marital satisfaction due to the variable number of years of marriage?

In order to answer this question, the averages and standard deviations of marital satisfaction were extracted according to the variable number of years of marriage. table (5) shows these averages:

Table (5) shows that there are apparent differences in the averages on the marital satisfaction scale according to the

variable years of marriage. To find out the significance of these differences, a single-variance analysis test was performed. Table (6) shows these results:

Table 5. Averages and standard deviations of marital satisfaction according to the variable years of marriage

Years of marriage	Number	Average	Standard deviations
1-10	49	3.45	.755
11-20	50	3.21	.768
Up of 21	66	3.30	.797

Table 6. Results of the analysis of the variance of the variance to determine the significance of the differences of marital satisfaction according to the variable years of marriage

Source of variation	Total squares	Degrees of freedom	Average squares	(P) Value	Level of significance
Between groups	1.389	2	.695	1.154	.318
Within groups	97.528	162	.602		
total	98.918	164			

Table (6) shows that the value of "P" was (1.154) is not statistically significant meaning that there are no statistically significant differences in marital satisfaction due to the variable number of years of marriage.

3-Results related to the third question: Are there differences of statistical significance ( $\alpha=0.05$ ) in the level of marital satisfaction due to the variable number of children?

To answer this question, the averages and standard deviations of marital satisfaction were extracted according to the number of children variable. Table (7) shows these averages:

Table 7. Averages and standard deviations of marital satisfaction according to the variable number of children

Number of children	Number	Average	standard deviations
One or less	26	3.48	.883
From two to three	56	3.29	.679
four or more	83	3.28	.806
total	165	3.32	.777

Table (7) shows the existence of differences in the statistical averages on the scale of marital satisfaction according to the variable number of children. To find out the significance of these differences, a single-variance analysis test was performed. Table (8) shows these results:

Table 8. univariate analysis results to determine the significance of differences, in the scale of marital satisfaction according to the variable number of children

Source of variation	Total squares	Degrees of freedom	Average squares	(P) Value	Level of significance
Between groups	.811	2	.405	.669	.514
Within groups	98.107	162	.606		
total	98.918	164			

Table (8) shows that the value of "P" was 0.669 and is not statistically significant, meaning that there are no statistically significant differences in marital satisfaction due to the variable number of children.

4-Results related to the fourth question: Is there a statistically significant ( $\alpha=0.05$ ) relationship between the work of women and their marital satisfaction?

In order to answer the question about women's work, the frequencies and percentages were extracted and the use of the  $\chi^2$  test was used to determine the relationship between the work of women and the level of marital satisfaction, as shown in the table (9).

Table 9. Frequency and Percentages and  $\chi^2$  Test Relationship between levels of marital satisfaction and women's work

Degree of marital satisfaction	Number & The ratio (%)	Housewife	Working women	Retired	Total
Low grade	number	15	2	1	18
Low grade	The ratio (%)	9.1%	1.2%	.6%	10.9%
Medium degree	number	64	22	5	91
Medium degree	The ratio (%)	38.8%	13.3%	3.0%	55.2%
High degree	number	36	17	3	56
High degree	The ratio (%)	21.8%	10.3%	1.8%	33.9%

$\chi^2=2.790$       Degrees of freedom = 4      Statistical significance = 0.594

Table (9) shows that the results of the statistical analysis showed no statistically significant differences in the levels of marital satisfaction between working and non-working women.

5- Results related to the fifth question: Are there differences of statistical significance ( $\alpha=0.05$ ) in the level of marital satisfaction due to the variable educational level of women?

To answer this question, the averages and standard deviations of marital satisfaction were extracted according to the variable of the educational level of women. Table (10) shows these averages:

Table 10. Averages and standard deviations of marital satisfaction according to the variable educational level of women

Educational level	Number	Averages	standard deviation
Secondary or lower	52	2.94	.876
Diploma and Bachelor	102	3.49	.665
Postgraduate	11	3.52	.665

Table (10) shows that there are apparent differences in the averages mean on the marital satisfaction scale according to the variable of the educational level of women. In order to determine the significance of these differences, a single-variance analysis test was performed. Table (11) shows these results:

Table 11. Contrast analysis test to find out the significance of differences depending on the educational level of women

Source of variation	Total squares	Degrees of freedom	Average squares	(P) Value	Level of significance
Between groups	10.768	2	5.384	9.895	.000
Within groups	88.150	162	.544		
total	98.918	164			

Table (11) shows that the value of "P" was (9.895) its mean there are statistically significant differences in marital satisfaction due to the variable educational level of women, To find out who is the difference, Scheff's Test A post-comparison test was conducted According to the variable level of education for women and the table (12) shows these results:

Table 12. Scheff's test of the post-comparisons in marital satisfaction according to the variable educational level of women

Educational level	Diploma and Bachelor	Postgraduate
Secondary or lower	.54587-*	-.58343
Diploma and Bachelor		-0.0375

Table (12) shows statistically significant differences in marital satisfaction according to the variable level of education for women the differences between the same level of public secondary and lower and the campaign of diploma and bachelor and the differences came in favor of the diploma and bachelor that is marital satisfaction is higher than that of the public secondary school or less. The table shows no differences between the other educational levels.

6-Results related to the sixth question: Are there differences of statistical significance ( $\alpha=0.05$ ) in the level of marital satisfaction due to the variable income of the family?

To answer this question, the arithmetical averages and standard deviations of marital satisfaction were extracted according to the income level variable. Table (13) shows these averages:

Table 13. Averages and standard deviations of marital satisfaction according to the income level variable

Income level	Number	Average	standard deviation
Less than 500 JD	57	2.99	.910
From 501 to 1500 JD	63	3.50	.557
More than 1500 JD	45	3.46	.743

Table (13) shows that there are apparent differences in the averages on the marital satisfaction scale according to the income level variable, to find out the significance of these differences.

Table 14. The results of the single-variance analysis test to determine the significance of the differences in marital satisfaction according to the income level variable

Source of variation	Total squares	Degrees of freedom	Average squares	(P) Value	Level of significance
Between groups	9.061	2	4.531	8.168	.000
Within groups	89.856	162	.555		
total	98.918	164			

Table (14) shows that the "P" value is (8.168), there are statistically significant differences of marital satisfaction due



to the income level variable, To find out who is the difference, Scheff's Test A post-comparison test was conducted According to the variable of income, table (15) shows the results:

Table 15. Scheff's test of the post-comparisons in marital satisfaction according to the variable income level of women

Income level	From 501 to 1500	More than 1500
Less than 500	.50763-*	46959-*
From 501 to 1500		0.0380

Table (15) shows statistically significant differences in marital satisfaction according to the income level variable, the differences of those with income (501 to 1500), and that is the high level of marital satisfaction.

## 6. Discussion

Several studies have examined marital satisfaction, each study focused on relevant variables, Some studies emphasized on the importance of love in the occurrence of marital satisfaction such as study Carandang & Guda (2015), Other studies have tested the effect of communication in marital relationships such as study of Abbasi & Afsharinia (2015), The effect of age on marital satisfaction was also discussed in Dabone (2014), One of the variables studied in relation to marital satisfaction was the Rebello et al study (2014), which found an impact on love, partnership, and jealousy in determining the level of marital satisfaction, while the study by Javanmard & Garegozlo (2014) showed the role of some personal factors in marital satisfaction, related variables were Villa & Prette (2013) in Brazil, which dealt with social skills on marital satisfaction, The study of Yadalijamaloye et al (2013) focused on the study of the effect of self-assessment on marital satisfaction, this study sample was large and included only women, Bloch et al (2013) focused on the role of emotional exchange among couples and its impact on the level of marital satisfaction. The study of Zainah et al (2012) also examined the variables of the duration of marriage and income and its impact on levels of marital satisfaction. The current study was characterized by a female sample only, and dealt with many variables: years of marriage, number of children, work of women, educational level, and family income.

This study was similar to the study of Yadalijamaloye et al (2013) since the sample of the study is only women, and similar with the study of Zainah et al (2012) in that it dealt with the study of the variable number of years of marriage and family income and its effect on the level of marital satisfaction, The results of this study indicate the role of both the educational level and the family income in determining the levels of marital satisfaction, and this result is a logical result in line with the culture of the study society.

The educational level of women contributes to the high level of marital satisfaction and explains this through the high level of knowledge among women, which helps in understanding the nature of the marital relationship, and to have the ability to lead marital life and avoid its pitfalls, The level of education may be associated with increased problem-solving capacity, so women's education may be linked to stable marital relationships.

As for family income, it reflects the state of economic stability of the family, the results of the study indicate the role of family income in stabilizing marital status, this may be due to the fact that the level of family income is associated with the welfare of the marital relationship and thus affect the level of marital satisfaction.

The importance of the study is that the society of the study suffers from high divorce rates, and thus may contribute to the study of the risk factors that threaten the stability of marriage, and propose appropriate solutions to address them, in addition to identifying the factors supporting the marital relationship and work on their development.

## 7. Recommendation

- The activation of marriage counseling services for prospective couples may raise levels of marital satisfaction.
- Awareness of the importance of education and its supportive role in the marital relationship, Therefore, community awareness of the importance of education for women and their active role in the success of the marital relationship should be increased
- Preparing continuous training courses for couples about issues related to marital life and dealing with them.
- Awareness of the mechanism of managing the marital relationship within a low family income
- Conducting other studies with different dimensions to learn more about the subject of marital satisfaction.

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### Martial Satisfaction Scale

Number	Paragraph	Very low degree	A few degrees	Medium degree	Great degree	Very large degree
1.	I feel comfortable with my husband					
2.	Understanding is the basis of the dealings between me and my husband					
3.	My personal relationship with my husband is warm					
4.	My relationship with my husband achieved social support					
5.	I progress socially / professionally as a result of my husband's support for me					
6.	My husband encourages me to strengthen my relationships with my friends					
7.	My husband supports a relationships with my family					
8.	My husband helps me in the housework					
9.	I often agreed with my husband on how to deal with children					
10.	I share with my husband recreational activities					
11.	My relationship with my husband is more peaceful than the conflict					
12.	My husband looks like a lot of things to me					
13.	I get my husband's sympathy with me when I get sick					
14.	My husband deals positively if I make a mistake					
15.	I touch the state of constant tolerance by my husband					
16.	The most support I get in my social relationships is my husband's support					
17.	When my husband and I disagree, we resort to dialogue					
18.	My husband and I exchanged courtesy					
19.	My husband has qualities that fill the gaps that I suffer from					
20.	My husband appreciates the work I do					

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# Development of Housing Standards and Spatial Design Guidelines for Mobility Handicaps in Thailand

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Received: September 27, 2017

Accepted: October 29, 2017

Online Published: November 28, 2017

doi:10.5539/ass.v13n12p112

URL: <https://doi.org/10.5539/ass.v13n12p112>

## Abstract

The objectives of this research are 1) to compare the standards of housing design for mobility disabled at the domestic and universal levels, 2) to standardize the developing process of housing design guideline for mobility handicapped properly with the context of Thailand, and 3) to evaluate the proficiency of the guideline by employing both qualitative and quantitative research methods. Regarding the guidelines comparison, the results indicated that the available housing design guidelines in Thailand had excluded the spatial allocation standard for supporting the mobility dependency as well as some particular dwelling functions had been abandoned from these guidelines. Furthermore, it appeared that these design guidelines were not constituted based on the participatory of multidisciplinary experts, for instance, medical and architectural professionals. This research had initiated an evaluating process for the guideline's competence by using four indicators, namely, 1) comprehension, 2) completeness, 3) convenience, and 4) composition of design. The rating scale questionnaires were distributed to the two sampling groups comprising the group of 30 experienced Government agencies and the group of 30 mobility handicapped. The data collection consisted of two main steps: 1) the assessment of the comparative study-based guideline and 2) the assessment of the participatory-based guideline. The data retrieved from these two phases were analyzed by the inferential statistics, Paired Sample t-test. The results revealed the differences between these two sampling groups in every design category at the significance level of 0.05. It was clear that the participatory-based guideline was more efficient than the comparative study-based guideline ( $p \leq 0.005$ ). Besides, the evaluating scores addressed by the group of experienced Government agencies and the group of mobility disabled representative were discovered significantly contrary.

**Keywords:** people with disabilities (PWD), accessibility, guideline, multidisciplinary group

## 1. Introduction

### 1.1 People with Mobility Disabilities

Nowadays, the population structure in Thailand has changed and has been dramatically increased from the past concerning numbers and the elderly proportion. In 2558 B.E, there was the total number of the elderly were 10.7 million (Knodel et al., 2015). Thus, it would be led to the elderly society. Their traditional life styles had a great effect on their health with chronic ailments such as diabetes, heart attack, cancer, etc. If they are not properly treated, they will have their health problems, even if physical disabilities in the future. This means that these handicaps will have difficulties in leading their lives both physical and mental conditions. From the handicap data in Thailand, the rate of the disabled people of Thailand in 2559 B.E. was highly gone to 10 percent of the total number of the elderly which was around 1,597,775 (Sukkay, 2016), the highest number of the physical handicaps, for about 765,561 people, resulting in providing them the social welfare and facilities for their better life quality by Thailand government. Hamid et al. (2011) thought that the housing adjustment for mobility handicaps will enhance them to have a better living incongruent with Fang & Iwarsson (2007) which claimed that "housing design was needed for mobility disabilities to use the residential areas easily with convenience led to their better lives". Thus, the housing adjustment was the main issue affecting the life quality of the mobility handicaps to reach and do their daily routine due to having a great number of them as claimed by Saito (2006) that "Designing the environment without considering the physical potential of mobility handicaps would cause some hindrances in doing their daily routine. The cause of this problem resulted from the lack of readiness in housing adjustment as well as no information or guidelines for housing adjustment. There were two forms of housing adjustment; (1) housing adjustment after having one member of the family becoming a mobility handicap from the accident or having a chronic ailment (2) the new residence was built for people with mobility disabilities by birth so the housing design for them should have a manual in adjusting the proper residence and enabled them to do their daily activities conveniently without any obstacles in access to the residential areas conforming to Hogan's concept (1992) that "the housing design for the mobility handicaps should meet their needs of the dwellers in considering the design for doing their daily routine in line with Fange & Iwarsson (2005) about the relationship of housing accessibility by claiming that the physical feature affecting individual factor and body function

and inconsistent with Sukkay & Upala (2015) concluded that the evaluation on the mobility handicap's residence had to used factors affecting accessibility, usability without anybody function obstacles and the ability to use the helping equipment. Thus, finding the information and designing the residence for the mobility handicaps would enhance them to know and understand the housing adjustment.

### *1.2 Previous Aboard Guideline for People with Mobility Disabilities*

There were many problems about accessibility and daily activity performance for people with mobility disabilities as Tongsiri et al. (2017) addressed that designing the environment without considering the physical potentials of mobility handicaps would cause some hindrances in doing their daily routine. The cause of this problem resulted from the lack of readiness in housing adjustment as well as having no information or guidelines for housing adjustment. There were two forms of housing adjustment; (1) housing adjustment after having one member of the family becoming a mobility handicap from the accident or having a chronic ailment (2) the new residence was built for newborn mobility disabilities so the housing design for them should have a manual book in adjusting the proper residence and enabled them to do their daily activities conveniently without any obstacles in access to the residential areas conforming to Hello et al. (2011) supposed that "the housing design for the mobility handicaps should meet their needs of the dwellers in considering the design for doing their daily routine in line with Fange & Iwarsson (2005) about the relationship of housing accessibility by claiming that the physical feature affecting individual factor and body function.

### *Previous Thailand Guideline for People with Mobility Disabilities*

The guideline for people with mobility disabilities was first created in America called universal design standard of America. Story et al. (1998) proposed that concept for universal design was the concept for all to facilitate them to be access to the areas as well as to promote the protection and safety of the dwellers by considering the facility factors inside and outside the buildings for everyone to apply and reach easily. There were seven topics on the universal design concept; (1) equitable use in different ages and abilities (2) flexible use (3) simple and intuitive use (4) perceptible information (5) durable for error (6) low physical efforts and (7) size and space for accessibility and utility. Topics containing in the guideline were car parking, slope way and entrance to toilet, lift and stairs. The spatial design should be included the mentioned areas, the diameter of using the wheelchairs of people with mobility disabilities which was around 1.50 meters. Later on, in 1990 A. D. one department lay the American Disability Act which its content containing in the guideline was the designing standard identified the minimum area size for the mobility disability people in the use of a wheel chair. According to this guideline, many developed countries saw its importance. In 1999 England developed the manual of housing design of the public buildings and the residence for people with mobility disabilities following the concept for universal design, applied and given its technical term "inclusive design for all" which means designing the environment of the public buildings and the residence for people with mobility disabilities responding to mental and physical needs (Clarkson & Coleman, 2015). From this concept, Imrie (2001) stated that the contents presented in the manual used the citation of the diameter of 1.50 meters in using the wheel chair for the mobility handicaps. Besides, the size of the room area and the furniture installation distance were mentioned in the guideline such as the hand reach distance of male and female handicaps in Europe like Ireland, Norway, Sweden, Denmark and Finland. The governments of those countries had the policy in developing the manual but giving the new technical terms used in it such as the new word "spatial design for all" taken from the words from the former guideline "spatial design for mobility handicaps". Bendixen & Benktzon (2015) claimed that the earlier mentioned manual of housing design of the public buildings and the residence was developed conforming to the universal design. Uden et al. (2013) concluded that the guidelines on housing spatial adjustment for mobility handicaps of each country had the difference in the presentation of the area size and the furniture installation distance by focusing on individual body functions congruent with Fange et al. (2013) they said housing adjustment for mobility handicaps in Sweden had been taken from the analysis on the ability to do their daily routine related to the area requirements from the research identifying the body potentials of the mobility handicaps which influenced the spatial design in their residence.

### *1.3 Previous Thailand Guideline for People with Mobility Disabilities*

Thailand began to set the facilities in the buildings for handicaps or elderly by Ministry of Interior passed ministerial regulation under the Building Control Act, 2548 B.E. (National, 2012) which regulated hospital, nursing home, public health service center, health station, government building and public building with its total area more than 300 square meters as well as private office, hotel, theater and meeting room with the area more than 2000 square meters had to design the facilities for mobility handicaps; sign, slope way, lift, stairs, car park, entrance to the building, corridor, door, toilet and tangible surface. From seven concepts on universal design, distance, area size, presentation technique in the manual, plan writing, side picture and details of furniture in every room. After that, during 2552-2556, the manual was improved but its contents remained the same and designed the area by referring to the diameter size of using the wheelchair of the mobility handicaps with 1.50 meters wide like America. Many government organizations starting from public health organizations, handicap welfare organizations such as Office of Health Promotion Fund, Thai Handicap Foundation, Department of Life Quality of Persons with Disability Promotion and Development, Ministry of Public Health including Engineering and Architectural Professional Offices such as Department of Public Works, Architect Council, Elderly Action Unit, Chulalongkorn University, etc. From the analysis of all guidelines developed from 2548-2556, the same things were the explanation of the utilized areas, a part of the building such as slope way, stairs, lift, entrance, car park, toilet and so on. Also, there was no explanation of the completely utilized areas such as

slope way, living room, dining room, bedroom, bathroom, outside garden, electrical system, emergency equipment system, etc. This led to the repeated contents and the interesting issue was the whole process of the manual development done by a single workplace which resulted in the manual contents not cover the architectural design and the design on physical ability development along with the medical concepts including all former manual developments had no classification of self-assistance of people with mobility disabilities related to the utilized areas. Sukkay (2016) stated that Thailand had never developed the manual via the multidisciplinary participation from medical and architectural professionals in line with Tongsiri & Hawusutsima (2013). They claimed that the measurement of the body-functioning ability level in performing daily activities of mobility handicaps was in accordance with the concept on international classification functions (ICF), the medical concept, was important for the design of the utilized area size for mobility handicaps in congruence with the concept of Iwarsson & Slaug (2010) that the classification of their body functions and the convenience in doing their daily activities in the area was the main information for housing design. Thus, it was clearly seen that the manual development for the handicaps in Thailand lacked some information such as size, the distance of every room in the residence, and the manual development from a multidisciplinary group; medical and architectural.

This research consisted of seven parts; (1) Introduction (2) Literature review (3) Research framework (4) Research methodology (5) Research analysis and result (6) Conclusion and discussion (7) Suggestions to private and government sectors including mobility handicaps, their relatives and family, and the hospital.

**2. Literature Reviews**

From the literature reviews, the contents were divided into three groups; the analysis on housing design for people with mobility disabilities in Thailand, the concept on area accessibility of mobility handicaps, the concept on the classification international classification functions (ICF) and the concept on the manual design. The three concepts were the significant information in the manual development as shown in figure 1.

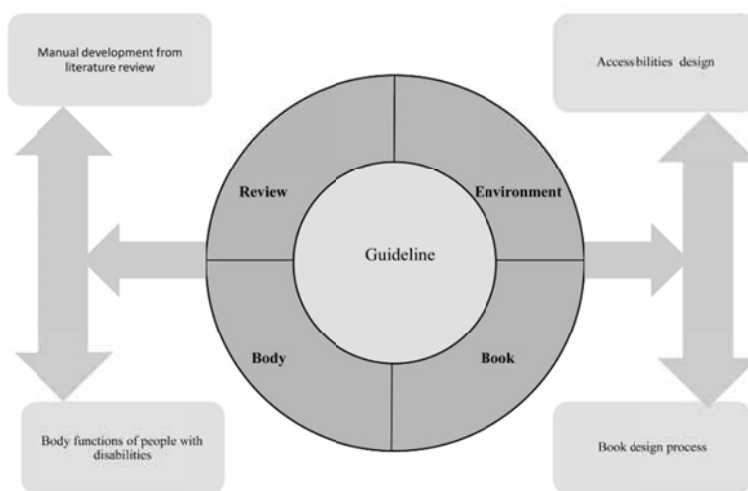


Figure 1. Literature review diagram

*2.1 Reviews Thailand Disabilities Guideline*

The guideline on housing design for mobility handicaps abroad was originated from America, known as universal design standard and its contents was applied from the concept of the design for all and the topics listed in the manual explained about car park, slope way, entrance, door, stairs, lift, corridor, bed room, bath room, electrical system and fire emergency system, covering the spatial design of public and residential buildings. The contents of the manual illustrated the room size and furniture installation distance by citing from the diameter of using the wheelchair of the mobility handicaps at the lowest width 1.50 meters. Then, England created the same manual, that was the inclusive design following the American area topics but different in details of handicap proportion. Meanwhile, Canada had the housing design manual for mobility handicaps like America but the difference was just the details of the utilized areas which were the dining room and the kitchen. Many countries like Ireland, Sweden and Netherland had developed their housing manuals containing the same topics but putting more details of the furniture distance. Moreover, the housing manuals from these countries were divided into two manuals; one was the housing manual for the public buildings, another was the residence for people with mobility disabilities. The concept of accessibility design was applied in the manual (Iwarsson & Stahl, 2003).

The housing design manual for people with mobility disabilities in Thailand started in 2548 B.E., all public buildings for mobility handicaps in Thailand had to provide the facilities by presenting the room size, the areas and the furniture installation distance, the concept taken from universal design with seven topics by focusing on accessibility design for only the mobility handicaps who could help themselves. Later on, from 2552 to 2556 B.E., the housing manuals were continuously developed but the contents in the manuals were still exactly the same as contained in the 2548 manual

and the manual development was done by the sole (Phaholthep et al., 2017).

From the comparison on the difference between foreign countries and Thailand, it was discovered that the housing manual development in Thailand had never been cooperatively done by medical and architectural professionals and had no spatial designs for mobility handicaps who could not help themselves, Most significance of all, there were no complete explanations about the topics on the utilized areas as shown in figure2

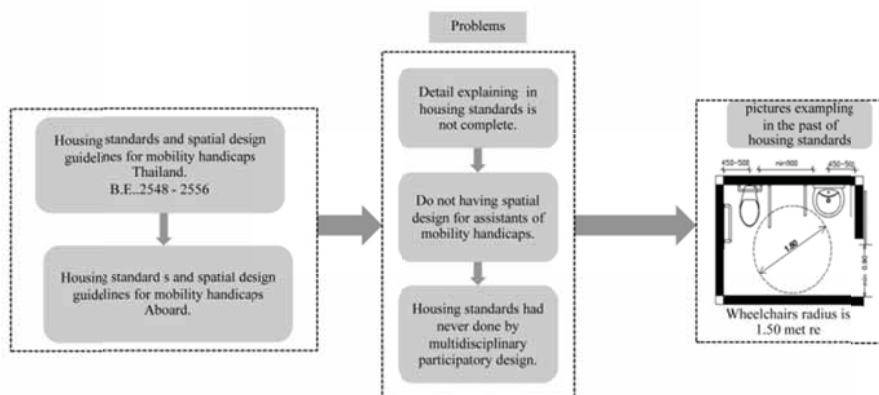


Figure 2. Diagram of the analysis on the housing manual for people with mobility disabilities

Table 1. The comparison of the same topics found in the housing manuals between Thailand and foreign countries

Country	Content of Guideline												
	Check List												
	Parking	Ramp	Entrance	Door	Stairs	Railing	Lift	Corridor	Bed room	Toilet Room	Living	Electrical	Emergency
1. Barrier Free Design Guide Canada (1998)	[Horizontal line]												
2. ADA Standards for accessible Design. USA. (2010)	[Horizontal line]												
3. Universal Design Guidelines Home Ireland. (2015)	[Horizontal line]												
4. Inclusive Design Standard UK. (2012)	[Horizontal line]												
5. Thailand guideline for people mobility disabilities (B.E. 2548)	[Horizontal line]										No topic		
6. Thailand guideline for people mobility disabilities (B. E. 2556)	[Horizontal line]										No topic		

2.2 Accessibility Concept

There were three factors on the concept of accessibility design by considering the provision of the facilities for people with mobility disabilities. (1) Reach the preparation for the mobility handicaps from the outside area to easily reach the inside area. (2) Enter the preparation for the users to enter every utilized area easily and consider doing the activities conveniently. From this concept, it emphasized the accessibility to do all activities without any hindrances as Laura et al (2016) stated that the spatial design must have the room area wide and long by citing from the diameter of using the wheelchair of people with mobility disabilities with self-assistance and having an accessible distance to furniture and facilities in every room like a rail.

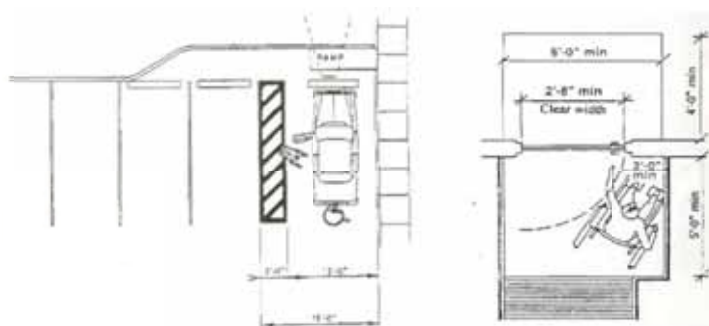


Figure 3. Pictures depicted in housing manual for people with mobility disabilities of England  
Source: www.http://:learninglegacy.independent.gov.uk/publications/inclusive-design-standards.php

2.3 Book Design

Book design means planning on the physical structure of the book by considering the factors' placement led to the book's shape and symmetry. The qualitative book contains beauty, readability, interesting as well as having an

appropriateness for the book itself publishing objectives, composed of four factors; function, infographic design process, content comprehension, and comfort. The four factors make the readers comprehend the contents and satisfied with the book design (Laing & Masoondian, 2016).

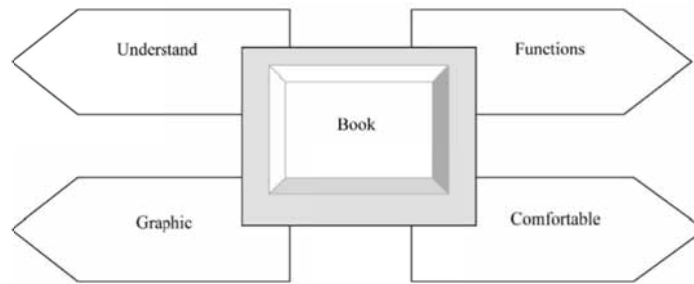


Figure 4. Book design concept

2.4 Conceptual Framework

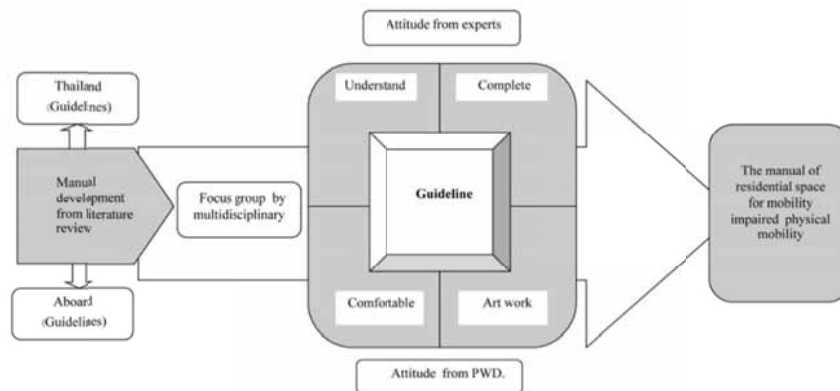


Figure 5. Research conceptual framework

3. Method

This research aimed to compare the standards of housing design for mobility handicaps at domestic and universal levels, (2) to improve the process of housing development guidelines meeting the standard requirement and appropriate for Thailand contexts (3) and to examine the guideline quality based on qualitative and quantitative research. Thus, this research has consisted of four steps in accordance with its objectives and framework.

3.1 Identify Subsections

The process of the guideline development started from literature review through contrastive analysis on the development of housing guidelines for mobility handicaps between Thailand and foreign countries. Then, information gained from the analysis was taken to develop the manual until the finish and it was checked for its quality by the manual indicators which were the pre-test questionnaire with five rating scales for evaluating its quality in round one with 30 manuals experienced government official’s in Thailand and 30 mobility handicaps with self-assistance. Then, the collected data was analyzed and taken into the focus group discussion by 10 experts from the multidisciplinary group; medical and architectural. After the focus group, the manual was tested for its quality via the manual indicators in the second round with the same questionnaire, called post-test, to the same sample group. The two data were concluded for the suggestions on the development of housing guidelines for mobility handicaps as shown in figure 6.

3.2 Participant (Subject Characteristics)

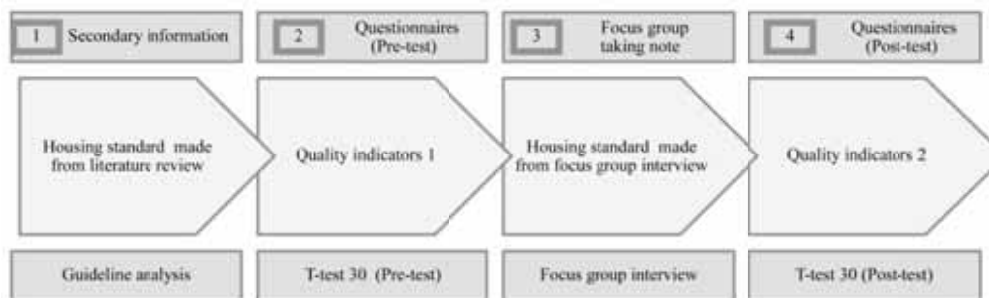


Figure 6. Methodology research mapping

The sample selection of group one was done through purposive sampling from government officials having experience in the development of housing design manual for mobility handicaps at the total number of thirty subjects; twenty

architects and engineers from Office of Public Works in Bangkok and ten officials from Office of Health Promotion. The second group consisted of thirty samples; twenty mobility handicaps from Sirinthorn Center by purposive sampling and ten elderly with mobility disabilities.

3.3 Sampling Procedures

The sample selection of group one was done through purposive sampling from government officials having experience in the development of housing design manual for mobility handicaps at the total number of thirty subjects; twenty architects and engineers from Office of Public Works in Bangkok and ten officials from Office of Health Promotion . The second group consisted of thirty samples; twenty mobility handicaps from Sirinthorn Center by purposive sampling and ten elderly with mobility disabilities.

3.3.1 Measures and Covariates

Tools used in this research were a focus group by multidisciplinary professionals in the manual development and a five-scale questionnaire with four indicators concerning the manual quality; comprehension in the manual, the completeness of the manual, the convenience in housing design adjustment and satisfaction towards the art factor in the manual.

3.3.2 Research Design

(1) Literature reviews through synthesizing and analyzing the housing development manual for mobility handicaps in Thailand and foreign countries by the researcher in identifying the problems and the differences found in the manual. Then, data were analyzed and applied for the manual development via presenting size and distance of car park, slope way, door, entrance, living room, bathroom, bedroom, kitchen, outside garden, electrical system and fire prevention system.

(2) Inspecting the manual quality by applying the indicators in the first round through the pretest questionnaire from two sample groups; thirty government officials and thirty mobility handicaps by sending and returning the questionnaire by post.

(3) The focus group done by multidisciplinary professionals followed the suggestions from the pre-test questionnaire and created the second manual. The focus group discussion run by the researcher which consumed three hours at the meeting of Faculty of Architecture along with sound recording and taking pictures and notes. The important contents could be concluded as follows: the added distance of the helper of the mobility handicap in spatial design of the diameter distance of using the wheelchair from 1.50 meters to 1.80 meters by adding the presentation of every plan of car park, slope way, entrance, living room, dining room, kitchen, bathroom, bedroom, outside garden, electrical system and fire emergency system as the depicted pictures in the manual shown in figure 7.

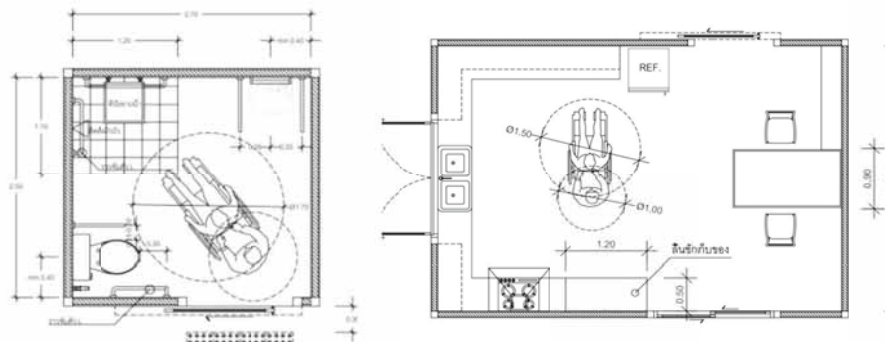


Figure7. Toilet plan and dining room plan in guideline

(4) Inspecting the manual quality by applying the indicators in the second time through the post-test questionnaire sent to the same sample groups and returned it by post on the date scheduled by the researcher.

3.3.3 Variables

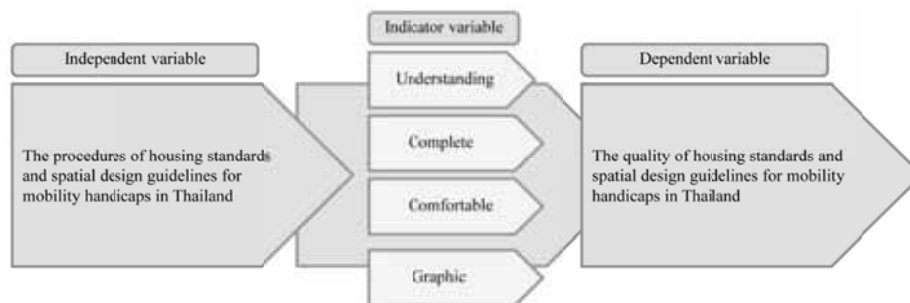


Figure 8. Variable diagram



## 4. Results

### 4.1 Recruitment

The understanding of the four research step 1).Literature reviews through the analysis and the comparison the housing manual for mobility handicap 2).The manual development after literature review 3).Inspecting the manual quality by applying the indicators in the first round with the pre-test questionnaire to two groups; thirty experienced government officials and thirty mobility handicaps 4).Taking the information from the pre-test questionnaire brought into the focus group discussion by ten multidisciplinary groups; five from the medical group and five from the architectural group as the following results.

#### Result from Focus group interview

From the focus group results organized by the researcher via an open-ended questionnaire with its question-how does the housing manual for mobility handicaps in Thailand look like? and the results from sound recording and note taking could be concluded as follows.

*The first doctor:* “The manual should classify the mobility handicaps according to the body organ weakness and level of doing an activity from the concept of international classification of functioning”.

*The second doctor:* “The housing function design should be taken into consideration in terms of the areas for the disabled assistant such as the area for the family member to push the wheelchair for the handicap from 1.50 meters which were the lowest diameter standard of the mobility person with self-able assistance to 1.80 meters”.

*The third interviewer, a physical therapist:* “The manual should add more topics on taking care of the handicaps in long - term care and basically rehabilitating their muscles.”

*The fourth informant, a community architecture:*“The principle of housing design should be classified according to the body function of the handicaps; for self-able assisting handicap used the same diameter with the distance of 1.50 meters while the self-unable assisting should be at 1.80”.

*The fifth informant, an academic:* “The housing manual design for mobility handicaps should add more details of the materials and their estimated building price”.

From five experts’ views, they were very useful and congruent with one another. Thus, the researchers applied these suggestions for the development of housing manual design for people with mobility disabilities for the second development of the residential manual.

### 4.2 Statistics and Data Analysis

After the focus group from ten experts, the researcher created the second manual and inspected its quality with the second indicators by distributing the post-test questionnaire to the same sample group as the result shown in table 2. Inspecting the manual quality by using the five-rating scale questionnaire of four variables; (1) content understanding (2) content completeness (3) convenience of the area adjustment (4) Satisfaction towards the art factor. It was found that the results collected from the first sample group (thirty government officials) shown in table 2 and the result from the second group appeared in table 3.

Table 2. Result on the analysis of comprehension, completeness, convenience and satisfaction towards the art factor in the manual from thirty government officials

Topic	Understanding				Complete				Comfortable			
	Mean	SD	t	Sig	Mean	SD	t	Sig	Mean	SD	t	Sig
Pre-parking	2.83	1.02	4.862	0.00	2.53	1.008	6.142	0.000	2.43	0.858	7.710	0.000
Post-parking	3.90	0.923			3.93	0.944			4.13	0.937		
Pre-ramp	3.00	0.974	4.447	0.00	2.83	0.874	4.649	0.000	2.77	0.898	4.858	0.000
Post-ramp	4.03	0.809			3.93	1.015			3.93	1.015		
Pre-entrance	3.07	0.868	3.657	0.001	2.87	0.860	5.570	0.000	2.97	0.890	5.253	0.000
Post-entrance	3.97	0.999			4.03	0.890			4.03	0.890		
Pre-door	3.13	1.167	3.877	0.001	2.93	0.944	5.288	0.000	2.90	0.900	5.676	0.000
Post-door	4.00	0.830			4.13	0.819			4.00	0.802		
Pre-living room	3.23	0.898	3.516	0.001	3.23	0.898	4.267	0.000	2.77	0.898	6.283	0.000
Post-living room	4.00	0.910			4.13	0.860			4.17	0.874		
Pre-kitchen	3.23	0.898	3.635	0.001	2.77	0.898	4.858	0.000	2.77	0.898	7.393	0.000
Post-kitchen	4.10	0.845			3.93	1.015			4.17	0.834		
Pre-bathroom	3.07	0.907	5.321	0.000	2.83	0.848	5.718	0.000	2.73	0.828	7.594	0.000
Post-bathroom	4.20	0.805			4.00	0.802			4.27	0.907		
Pre-bed room	3.37	0.765	4.000	0.000	2.90	0.759	5.356	0.000	2.97	0.928	5.856	0.000
Post-bed room	4.17	0.834			4.00	0.947			4.07	0.907		

Pre-landscape	3.30	0.877	3.699	0.001	3.20	0.961	3.619	0.001	3.07	0.907	4.853	0.000
Post-landscape	4.13	0.819			4.13	0.973			4.17	0.913		
Pre-emergency	3.03	0.850	5.406	0.00	2.87	0.776	7.244	0.00	2.87	0.776	7.102	0.000
Post-emergency	4.10	0.845			4.23	0.858			4.20	0.761		
Pre-electronic	3.13	0.860	4.785	0.00	2.93	0.944	5.288	0.000	2.97	0.765	6.647	0.000
Post-electronic	4.13	0.937			4.13	0.819			4.27	0.944		

\*p<.05 is the level of significance

From table 1, it indicated that the government officials had more understanding of the contents of the manual, felt more completeness and more convenience in the area adjustment from the second manual than the first one at the significantly different level of 0.05 in all topics of the manual. Due to all topics of housing design; car park, slope way, entrance, living room, dining room, kitchen, bathroom, bedroom, outside garden, electrical system and fire emergency system. These areas all rooms were wider than the ones in the first manual from 1.50 meters to 1.80 meters in the case of using the wheelchair. It reflected that the government officials had the understanding of the contents of the manual, perceived the completeness and the convenience in the use of the manual. From the focus group discussion by the multidisciplinary group (the second manual), the interesting results were the bathroom which the government official understood most (4.20) the electrical system, the area the government officials perceived its completeness most (4.13) and followed by the bathroom, the government officials perceived its convenience in adjustment most (4.27).

Table 3. Result on the analysis of comprehension, completeness, convenience and satisfaction towards the art factor in the manual from thirty mobility handicaps

Topic	Understanding				Complete				Comfortable			
	Mean	SD	t	Sig	Mean	SD	t	Sig	Mean	SD	t	Sig
Pre-parking	2.97	1.217	3.890	0.004	3.03	1.217	3.717	0.001	2.97	1.033	4.678	0.000
Post-parking	3.77	0.679			3.77	0.728			3.73	0.691		
Pre-ramp	3.10	1.029	5.221	0.000	2.93	1.202	5.960	0.000	3.23	1.278	3.633	0.001
Post-ramp	3.93	0.624			4.00	0.643			3.93	0.828		
Pre-entrance	3.37	1.129	3.616	0.001	3.00	1.145	4.557	0.000	3.03	1.098	4.397	0.000
Post-entrance	3.93	0.740			3.87	0.730			3.83	0.747		
Pre-door	3.47	0.900	3.294	0.003	2.97	0.999	7.059	0.000	2.90	1.213	6.279	0.000
Post-door	3.93	0.828			4.03	0.765			4.00	0.830		
Pre-living room	3.37	0.926	4.583	0.000	3.13	1.074	5.869	0.000	3.20	0.997	5.835	0.000
Post-living room	4.07	0.785			4.17	0.699			4.10	0.759		
Pre-kitchen	3.27	1.112	2.734	0.011	3.17	1.053	4.097	0.000	3.07	1.112	4.878	0.000
Post-kitchen	3.83	0.791			3.90	0.759			3.93	0.740		
Pre-bathroom	3.20	0.997	4.000	0.000	2.97	0.850	6.500	0.000	2.63	1.098	6.495	0.000
Post-bathroom	4.00	0.743			3.83	0.531			3.87	0.629		
Pre-bed room	3.27	1.015	4.428	0.000	3.17	0.950	4.097	0.000	3.30	0.750	4.039	0.000
Post-bed room	4.00	0.743			3.90	0.845			3.90	0.712		
Pre-landscape	3.23	1.104	4.026	0.000	3.13	0.900	5.215	0.000	2.90	1.029	6.484	0.000
Post-landscape	3.93	0.785			4.17	0.785			4.07	0.868		
Pre-electrical	3.33	0.884	5.869	0.000	3.13	1.042	4.557	0.000	3.23	1.006	4.334	0.000
Post-electrical	4.00	0.830			4.00	0.830			4.07	0.691		
Pre-emergency	3.00	1.050	3.959	0.000	3.00	0.983	5.154	0.000	3.13	1.074	4.983	0.000
Post-emergency	4.03	0.718			4.03	0.809			4.20	0.664		

\*p<. 05 is the level of significance

From table 3, it illustrated that mobility handicaps had more understanding of the contents of the manual, perceived more completeness and convenience for adjustment area in the second manual than the first one at the significant level of difference 0.05 in all topics of the manual (p<.05=0.00). This is because there was a classification of the mobility handicaps from focus group interviews into designing for self-able and self-unable assistance. It was discovered that the living room was the room which was the most understanding and feel completeness by the mobility handicaps (4.07) and (4.17) and the emergency system which was the most convenience for adjustment housing by the mobility handicaps. (4.20).

Table 4. Result on data collection from post-test questionnaire of the variable of content understanding in the manual from the two groups

Understanding	People with disabilities N = 30				Employees N = 30			
	Mean	SD	t	Sig	Mean	SD	t	Sig
Pre-parking	2.97	1.202	3.890	0.004	2.80	1.02	4.862	0.00
Post-parking	3.77	0.679			3.90	0.923		
Pre-ramp	3.10	1.029	5.221	0.000	3.00	0.947	4.447	0.00
Post-ramp	3.93	0.640			4.03	0.809		
Pre-entrance	3.37	1.129	3.616	0.001	3.07	0.868	3.657	0.001
Post-entrance	3.93	0.740			3.97	0.999		
Pre-door	3.47	0.900	3.294	0.003	3.13	1.167	3.877	0.001
Post-door	3.93	0.828			4.00	0.830		
Pre-living room	3.37	0.924	4.583	0.000	3.23	0.898	3.516	0.001
Post-living room	4.07	0.785			4.00	0.910		
Pre-kitchen	3.27	1.112	2.734	0.011	3.23	0.898	3.635	0.001
Post-kitchen	3.83	0.791			4.10	0.845		
Pre-bathroom	3.20	0.997	4.000	0.000	3.07	0.907	5.321	0.000
Post-bathroom	4.00	0.743			4.20	0.805		
Pre-bed room	3.27	1.015	4.428	0.000	3.37	0.765	4.000	0.000
Post-bed room	4.00	0.743			4.17	0.834		
Pre-landscape	3.23	1.104	4.026	0.000	3.30	0.877	3.699	0.001
Post-landscape	3.93	0.785			4.13	0.819		
Pre-electrical	3.33	0.884	5.869	0.000	3.13	0.860	5.406	0.00
Post-electrical	4.00	0.830			4.13	0.937		
Pre-emergency	3.00	1.050	3.959	0.000	3.03	0.850	4.785	0.00
Post-emergency	4.03	0.718			4.10	0.845		

\*p<.05 is the level of significance

From Table 4 Result of the comparison on the understanding of the manual contents between two groups, it was revealed that the living room was the only room which the mobility handicaps perceived the content understanding in the manual more than the government officials (4.07) meanwhile the interesting result was that the government official group had the content understanding in the manual nearly all topics except the living room more than the mobility handicap group and the government officials having the understanding most was the bathroom (4.20).

Table 5. Result on the comparison of data collection from the post-test questionnaire on the completeness of manual contents of the two groups

Completeness	People with disabilities N = 30				Employees N = 30			
	Mean	SD	t	Sig	Mean	SD	t	Sig
Pre-parking	3.03	1.217	3.717	0.001	2.53	1.008	6.142	0.000
Post-parking	3.77	0.728			3.93	0.911		
Pre-ramp	2.93	1.202	5.960	0.000	2.83	0.874	4.649	0.000
Post-ramp	4.00	0.643			3.93	1.015		
Pre-entrance	3.00	1.145	4.557	0.000	2.87	0.860	5.570	0.000
Post-entrance	3.87	0.730			4.03	0.890		
Pre-door	2.97	0.999	7.059	0.000	2.93	0.944	5.288	0.000
Post-door	4.03	0.765			4.13	0.819		
Pre-living room	3.13	1.074	5.869	0.000	3.23	0.898	4.267	0.000
Post-living room	4.17	0.699			4.13	0.860		
Pre-kitchen	3.17	1.053	4.097	0.000	2.77	0.898	4.858	0.000
Post-kitchen	3.90	0.759			3.93	1.015		
Pre-bathroom	2.97	0.850	6.500	0.000	2.83	0.848	5.718	0.000
Post-bathroom	3.83	0.531			4.00	0.802		
Pre-bed room	3.17	0.950	4.097	0.000	2.90	0.759	5.356	0.000

Post-bed room	3.90	0.845			4.00	0.947		
Pre-landscape	3.13	0.900	5.215	0.000	3.20	0.961	3.619	0.001
Post-landscape	4.07	0.785			4.13	0.973		
Pre-electrical	3.13	1.042	4.557	0.000	2.93	0.944	5.288	0.000
Post-electrical	4.00	0.830			4.13	0.819		
Pre-emergency	3.00	0.983	5.154	0.000	2.87	0.776	7.244	0.000
Post-emergency	4.03	0.809			4.23	0.858		

\*p<.05 is the level of significance

From Table 5 Result of the comparison on the content completeness in the manual between two groups, it was found that the government official group perceived the content completeness in the manual nearly all topics more than people with mobility disabilities except living room (4.17), slope way (4.00), outside garden (4.07) which the government officials perceived the content completeness less than people with mobility disabilities.

Table 6. Result on the comparison of data collection from the post – test questionnaire on convenience in the area adjustment of the two groups.

Convenience	People with disabilities N = 30				Employees N = 30			
	Mean	SD	t	Sig	Mean	SD	t	Sig
Pre-parking	2.97	1.033	4.678	0.000	2.43	0.858	7.710	0.000
Post-parking	3.73	0.691			4.13	0.937		
Pre-ramp	3.23	1.278	3.633	0.001	2.77	0.890	4.858	0.000
Post-ramp	3.93	0.828			3.93	0.890		
Pre-entrance	3.03	1.098	4.397	0.000	2.97	0.860	5.253	0.000
Post-entrance	3.83	0.747			4.03	0.890		
Pre-door	2.90	1.213	6.279	0.000	2.90	0.900	5.676	0.000
Post-door	4.00	0.83			4.00	0.802		
Pre-living room	3.20	0.997	5.835	0.000	2.77	0.898	6.283	0.000
Post-living room	4.10	0.759			4.17	0.874		
Pre-kitchen	3.07	1.112	4.878	0.000	2.77	0.898	7.393	0.000
Post-kitchen	3.93	0.740			4.17	0.834		
Pre-bathroom	2.63	1.098	6.495	0.000	2.73	0.828	7.594	0.000
Post-bathroom	3.87	0.629			4.27	0.907		
Pre-bed room	3.30	0.750	4.039	0.000	2.97	0.928	5.856	0.000
Post-bed room	3.90	0.712			4.07	0.907		
Pre-landscape	2.90	1.029	6.484	0.000	3.07	0.907	4.853	0.000
Post-landscape	4.07	0.868			4.17	0.913		
Pre-electrical	3.23	1.006	4.334	0.000	2.97	0.765	7.102	0.000
Post-electrical	4.07	0.691			4.27	0.944		
Pre-emergency	3.13	1.074	4.983	0.000	2.87	0.776	6.647	0.000
Post-emergency	4.20	0.664			4.20	0.762		

\*p<.05 is the level of significance

From Table 6 Result of the comparison on the convenience in the area adjustment between two groups, it indicated that the government official group perceived convenience in the area adjustment nearly all topics more than mobility handicaps except the electrical system (4.27) while the interesting results that slope way (3.93) and the door (4.00) were the areas which both groups perceived the same.

Table 7. Result on the analysis on satisfaction towards the art factor in the manual from thirty government officials

(Pre-Post of Satisfaction)	N	Mean	SD	t	Sig
Scale of guideline	30	1.267	0.907	7.648	0.000*
Content in guideline	30	0.233	0.430	2.971	0.006*
Text in guideline	30	0.567	0.971	3.195	0.003*
Picture in guideline	30	0.733	0.868	4.626	0.000*
Color in guideline	30	0.800	0.847	5.174	0.000*

\*p<.05 is the level of significance

From Table 7, it was revealed that the government officials had more satisfaction towards size, content, letter type,

picture and manual color in the second manual than in the first one at the significant level of difference 0.05 ( $p < .05 = 0.00$ ). The interesting result was that the government officials had the least satisfaction towards the content order (0.233) because of the procedure of doing the standard guideline from the focus group with the multidisciplinary group had different attitudes which cause the confusing.

Table 8. Result on the analysis on satisfaction towards the art factor in the manual from thirty mobility handicaps

(Pre-Post of Satisfaction)	N	Mean	SD	t	Sig
Scale of guideline	30	0.573	0.511	0.143	0.000*
Content in guideline	30	0.633	0.490	7.077	0.006*
Text in guideline	30	1.333	1.028	7.902	0.003*
Picture in guideline	30	1.167	0.117	5.722	0.000*
Color in guideline	30	1.167	1.053	6.067	0.000*

\* $p < .05$  is the level of significance

From Table 8, it was revealed that people with mobility disabilities had more satisfaction towards the art factor in the second manual than in the first one at the significant level of difference 0.05 ( $p < .05 = 0.00$ ). The interesting result was that people with mobility disabilities had the least satisfaction towards the manual size (0.573) owing to the first and the second manual sizes were the same, no adjustment for the handicaps. However, they had the satisfaction towards the letter type most (1.333) due to increasing the size of the letter, the highlight color for presenting the details of the materials and dimensions of the room which was obviously and comfortable to read.

**5. Discussion and Conclusion**

From the research objectives were to 1) to compare the standards of housing design for mobility disabled at the domestic and universal levels, 2) to standardize the developing process of housing design guideline for mobility handicapped properly with the context of Thailand, and 3) to evaluate the proficiency of the guideline by employing both qualitative and quantitative research methods. It was discovered that the differences in the guidelines for mobility handicaps of Thailand and foreign countries where the spatial design for people with disabilities, the spatial design for the handicap’s assistant, adding more area topics in all rooms and the guideline was never developed by the multidisciplinary group. Thus, the researchers improved the first guideline for mobility handicaps from the information gained from the guideline comparison by adding the designing area for the handicap’s assistant and arranged the content order appropriate for Thai people which were car park, slope way, entrance, living room, dining room, kitchen, bathroom, bedroom, outside garden, electrical system, fire emergency system and garden decoration inside the residence. Also, the guideline quality inspection via the research had the interesting results which were the two samples; the government officials and the mobility handicaps perceived the content understanding, the content completeness and the convenience in the area adjustment, and had the satisfaction towards the second guideline more than the first one at the significant level of difference 0.05 ( $p < .05 = 0.00$ ). The important research results were the content understanding of the government officials which was found that the bathroom design was the most understanding because the bathroom was the utilizing area with many details of furniture. From the presentation of the bathroom, it made the official group have more understanding while the mobility handicaps thought that the living room made them have more understanding. In terms of the content completeness, the interesting results were: the official group thought that the kitchen design was most (5.03) meanwhile the mobility handicaps thought that the kitchen design was least (3.90) now that the kitchen was the area with design details. Thus, they thought that the presentation of the area design distance in the kitchen lacked details and did not meet the requirement of the convenience in the use of the area as the design in the guideline. The interesting issues were: the perception on the design of the slope way and the door had the same mean scores (3.93) and (4.00) which meant that the slope way and the door design in the guideline made the two groups satisfied. The last issue, an outstanding point, the satisfaction on the book size design, mobility handicaps had the least satisfaction towards the size of the guideline (0.573) while the official group had the most satisfaction towards the size design of it (1.267) since the size of the guideline (0.21 x 0.16 มม) was suitable for general users who wanted the convenience in picking and using but the guideline size was too small for the handicaps to see clearly.



Figure 9. Bed room and living room in guideline

From the research results, it can be concluded that the development of housing guideline for mobility handicaps in Thailand should be participatory done from multidisciplinary professionals with the experience in taking care of people with mobility handicaps such as Ministry of Public Health and Council of Architect in order to create the quality guideline which could be applied for handicaps with ability and disability. The main point is that the awareness of the proportion of mobility handicaps and the design. There should be the classification of the ability levels in doing their daily activities as well as the proportion and the distance of the handicap's assistant because of the cultural difference between Thai and foreign countries. Basically, the family member will be the handicap's assistant. Thus, the proportion addition is the main factor in the development of housing guideline for people with mobility handicaps in Thailand in the future

### Recommendation

From the results of the development of housing guideline for mobility handicaps from multidisciplinary professionals, there are some beneficial suggestions given as follows.

- (1) The government sector should develop the housing guideline according to self-assisting abilities of the mobility handicaps through participation among Ministry of Public Health, Council of Architect and the sectors involving with mobility handicaps to create the appropriate and easily understandable guideline for mobility handicaps to apply.
- (2) The private sector should promote the design of furniture materials suitable for size and shape of mobility handicaps in the development of housing guideline for people with mobility handicaps.
- (3) The hospital should distribute the housing guideline to the patients and their relatives those who come to the hospital for health care service and want to adjust their residence for the certain person.
- (4) The mobility handicaps should check their own residence for the housing adjustment in order to follow the housing design from the guideline.
- (5) Mobility handicap's relative and family should be asked and surveyed for their size and shape as the handicap's helpers across Thailand to gain the information for the manual development in the future.

### Acknowledgments

I would like to thank you my thesis advisor who heartedly supervised my thesis from the start until the finish and to express my sincere and extreme gratitude to the experts, lecturers from Mahasarakham University, Chiang Mai University, Thammasat University and Khon Kaen University, physical therapists and doctors from Chiang Rai Prachanukhro Hospital, Mahidol Hospital, the officials from Office of Bangkok Public Works, and mobility handicaps from Sirintorn for Medical Ability Rehabilitation Center. Lastly, I would like to thank Chiang Rai Rajabhat University and King Mongkut's Institute of Technology Ladkrabang for their funds offered to me.

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# Drivers of Residential Energy Saving

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Received: September 28, 2017

Accepted: October 29, 2017

Online Published: November 28, 2017

doi:10.5539/ass.v13n12p125

URL: <https://doi.org/10.5539/ass.v13n12p125>

## Abstract

One of the main strategies in dealing with the problem of global warming in today's world is saving energy or employing an efficient use of energy. It is the intention of this study to investigate the determinants of residential energy saving. Seven motives for residential energy saving have been identified: the benefits of saving money, and solving the global warming problem, as well as accepting responsibility for energy, knowing how to save energy, committing to the saving of energy saving through pledges, having a role model for energy saving, and comparing the current energy bill with the previous months' bills. A total of 350 responses were collected from self-identified adult energy saving shoppers in Bangkok. The results of the multiple regression analysis indicated that the positive factors affecting residential energy saving were commitment to energy saving through making pledges, saving money, accepting saving energy as the person's responsibility, knowing how to save energy, and comparing one's current energy bill with that of the previous months. The analysis of the effective strategies for residential energy saving will be discussed.

**Keywords:** driver, determinant, motivation, energy saving, energy efficiency, residential

## 1. Introduction

Improvements in energy efficiency are a good idea, both in terms of business investment and as something that is vital for the global community. As with investment in renewable energy sources, for example wind and solar energy, investment in efficient energy presents great opportunities, particularly regarding the reduction of the use of fossil fuels such as gas, oil and coal. As a result, this will assist with the reduction of greenhouse gas emissions and hence the threat of change in the climate. According to the Asian Development Bank (ADB, 2015), Thailand and other Greater Mekong Subregion (GMS) countries-Cambodia, the Lao People's Democratic Republic (Lao PDR), Myanmar, and Vietnam-anticipate that the energy demand will triple over the next 15 to 20 years. In order to meet this increased demand, it is necessary to do more than simply add to the current domestic and imported energy supplies; that is, greatly-improved energy efficiency must also be included as an important part of the response to the current energy situation. The GMS countries need to make their supply- and demand-side energy efficiency measures part of the mainstream and in all sectors of their economies. Supply-side energy savings, for example, come mainly from measures implemented by public utilities and private sector investors in order to increase the efficiency of energy generation and to reduce the loss of the transmission and distribution of energy. On the other hand, most demand-side energy savings stems from the investment of industry and commercial users in terms of better production and transportation methods and from the more efficient use of more lighting, heating, and cooling, in addition to other appliances and transport vehicles used by households. The GMS countries foresee substantial energy savings over the next 15 to 20 years, and it has been asserted that Thailand will exhibit in its industry and transport sectors the highest energy savings score-from 20% to 40% (ADB, 2015). In Cambodia, the Lao PDR, and Myanmar the major sources of savings are seen to come from the residential and commercial sectors, and regarding Vietnam, the energy savings are expected to be the greatest in the industrial sector. It is important to remember that Thailand still does not pay much attention to energy savings in its residential sector, and this is significant since this sector uses 14.8% of the total energy in the country, third ranked after the industrial sector (36.8%) and the transportation sector (35.8%). It is the purpose of this study to investigate the factors affecting the energy saving in its residential sector.

## 2. Literature Review

### 2.1 Saving Money

Aravena et al. (2016) investigated the implementation of seven energy-efficient measures in the residential houses in Ireland, and the results indicated that the decision to invest in energy-efficient measures mainly derived from monetary or economic factors, for example, the gain in energy savings and the cost of measures on a private level. Comfort gains, on the other hand, were found to be a secondary factor, of little concern were the environmental benefits of energy-efficient measures, particularly when making investment decisions. Another study conducted by the U.S. Department of Energy (2013) indicated that saving money is the overwhelming motivating factor in people's decision to make improvements in their use of energy: everything else was seen to be secondary. Some of the participants in the focus groups in that study were seen to be concerned about protecting the environment and they indicated that that was what motivates them to take action regarding the use of energy: they want to "be responsible," "feel less guilt," "help



the government,” and “do their part” since it’s a “small planet with depleting resources.” Others were motivated by necessity; that is, something breaks for example and they want to fix it. Other reasons for making energy improvements included improving the value of the home, reducing maintenance costs, and increasing their comfort and improving their health (e.g., allergies) and safety (carbon monoxide poisoning). “Quietness” or less noise resulting from energy improvement was also perceived as a benefit of energy savings leading to one’s comfort; some were even seen to be motivated by the desire to improve the appearance of their home or to be motivated by peer pressure, that is, “keeping up with the Joneses.” More specifically, a recent study by Leelakulthanit (2017) has suggested that saving money is the main concern in promoting energy-saving behaviors in the use of air conditioners in Thailand. Therefore, it can be hypothesized that saving money is positively related to the saving of energy.

### *2.2 Environmental Benefits*

Clear individual benefits can be connected with sustainable energy behaviors. For example, some people may enjoy walking or riding a bicycle more than driving a car, a person can save money at home by using less energy, and using an electric vehicle can enhance a person’s perception of his/her status level. However, energy behaviors that are sustainable often cost a lot and require effort, and they are sometimes considered to be unpleasant. For example, insulating one’s home or installing solar panels can be considered troublesome and as costing a good deal of time and effort. Investing in energy-efficient technology can also be costly, and switching off appliances can be thought to require more trouble than it’s worth, and some people think that using certain appliances only when renewable energy sources are available limits their freedom of choice. Nevertheless, many people do engage in these behaviors despite their perception of these behaviors requiring money and effort. One of the questions to ask in this context is “What motivates people to engage in sustainable energy behavior that leads to higher expenditure of money and effort? People should not only consider the individual consequences of their behavior, but also broader consequences, and they should understand that sustainable energy behavior benefits the environment as it can result in the reduction of CO<sub>2</sub> emissions (Steg et al., 2014). It has been asserted that people are motivated to see themselves as engaging in morally-responsible behavior, such as sustainable energy behaviors, and this makes them feel that they are “doing the right thing” (Bolderdijk et al., 2013). This suggests that sustainable energy behavior is not only a product of individual considerations but is also a product of moral considerations. In fact, several studies have shown that moral considerations have a strong influence on sustainable energy behavior, such as the purchase of energy-saving light bulbs and making changes in the eating of meat products (Harland et al., 2007), Also cited in this connected is electricity saving at work (Zhang et al., 2013), energy-saving behaviors at home (Van der Werff & Steg, 2015), and the acceptability of energy policies (Steg et al., 2005; Steg & De Groot, 2010). It has also been suggested that becoming involved in sustainable energy behavior can make people feel good about themselves because they derive pleasure and satisfaction, as stated above, from doing the right thing (Bolderdijk et al., 2013; Venhoeven et al., 2013; Taufik et al., 2014). Thus, it can be hypothesized that seeing the benefit of helping to solve the global warming problem is positively related to energy saving.

### *2.3 Responsibility*

When we talk about perceived responsibility it means taking responsibility for energy conservation oneself (for example via self-blame, liability and personal obligation) rather than attributing that responsibility to someone else such as the government, environmental groups, industry or other external parties (Van Raaij & Verhallen, 1983). It has been often argued that feeling personally responsible for environmental problems, that is, blaming oneself for damage to the ecology and for protecting the environment, for example feeling the necessity to fight climate change oneself by driving a more efficient car can be associated with pro-environmental behavior in a positive way. In fact a number of researchers have suggested that when people feel personally responsible for environmental problems they tend to feel a stronger obligation to help reduce those problems and consider this to be a moral responsibility. It has also been suggested that when people feel this personal responsibility it increases their desire to act in a pro-environment way (see for example Abrahamse & Steg, 2011, 2009). On the other hand, if one denies his or her responsibility, that responsibility may be assigned to an external entity, thus implying that there is no need to change one’s behavior (Van Raaij & Verhallen, 1983). Hummel et al. (1978) (cited in Van Raaij & Verhallen, 1983) found in their empirical study that perceived self-blame on the part of energy consumers was related to a greater desire to save energy; on the other hand, blaming an external entity for the energy problems was seen to be related to a diminished desire to conserve energy. In research following the above-cited study, Hines et al.(1987) suggested that personal responsibility can be expressed in many ways. For example it can be expressed in terms of the entire environment in terms of protecting it and in terms of being socially responsible to the community in which one lives. It can also be expressed in terms of only one aspect of the environment. These authors, using a meta-analysis, concluded that people that feel responsible for the environment are more likely to perform responsible environmental behavior than those that do not feel this responsibility. Thus, it can be hypothesized that realizing that saving energy is one’s responsibility can be seen to be positively related to energy saving.

### *2.4 Knowledge*

People often do not understand the extent to which their behavior adds to climate change. For example, few people probably know that heating and cooling one’s home contribute to global warming (Bord et al., 2000). People have different perceptions of how what they do contributes to global warming, and typically people think that the causes of

global warming are activities outside their personal realm, for example industry, rather than their own behavior (Whitmarsh et al., 2011). Further, people's perceptions of their energy are not always accurate and this suggests that they may not be able to accurately judge the behavior that will effectively reduce energy consumption and CO<sub>2</sub> emissions—in fact, people tend to rely on a simple method when judging their household energy use—the size of appliances. The larger that the appliance is, the greater is the energy used according to this line of thought (Baird & Brier, 1981; Schuitema & Steg, 2005). This of course is not always true and can lead to the underestimation of the use of energy of certain small appliances, such as phone chargers, and the overestimation of the energy use of large appliances, like fans. In addition, people tend to underestimate the energy needed to heat water. This implies that people are not aware that they can save energy by taking fewer showers for example (Schuitema & Steg, 2005). Additionally, people think that they can save more energy by using appliances less, for example by turning lights off, rather than through improvements in efficiency, for example by installing higher-efficient light bulbs (Attari, 2010). In fact, the opposite is true according to experts.

Unfortunately knowledge is not always strongly related to environmental behavior, and this includes behavior regarding the use of energy. While some studies have demonstrated that greater environmental knowledge increases the likelihood of behavior that sustains energy (Hines et al., 1986/1987; Frick et al., 2004), other studies have shown that increased knowledge does not promote such behavior (Schahn & Holzer, 1990; Kollmuss & Agyeman, 2002; Meinhold & Malkus, 2005; Vicente-Molina et al., 2013). Not only that, but research has pointed out that different types of knowledge can predict environmental behavior in different ways, and that only knowledge related to action (for example understanding what you can do about environmental problems) and effectiveness (i.e., knowing the benefits or effectiveness of actions that support the environment) is able to predict environmental behavior (Steg et al., 2015). In this study, knowledge refers to knowing how to save energy at home, and therefore it can be hypothesized that knowledge of how to save energy is positively related to energy saving.

### *2.5 Pledging*

Commitment making is commonly regarded as an effective way to promote the behaviors that support the care for the environment; and the general idea is that when people engage in certain types of behavior, they adhere to this engagement, resulting in behavior change over time. Werner et al.'s (1995) study revealed that obtaining a signed commitment increased recycling in Salt Lake City, Utah, more than when the participant receive a flyer or a telephone call. A variety of studies in fact have highlighted when commitments are likely to be most adhered to. Written commitments appear to be more effective than verbal commitments (Pardini & Ketzew, 1983-84). In a study that investigated the impact of verbal as opposed to written commitments, households were assigned to one of three groups. In the first group, homes simply received a pamphlet underlining the importance of recycling newspapers, while in the second group, households made a verbal pledge to recycle newsprint. In the third group, a person in the household signed a statement whereby he/she committed him/herself to recycling newspapers. In the beginning, the households that made a verbal commitment recycled more newsprint than the households that received only a pamphlet; however, in the end only the individuals that committed themselves to recycling by signing a statement were still found to be recycling when a follow-up took place. Public commitment has perhaps a more striking impact, which was illustrated in a study in which either private commitment to conserving electricity and natural gas was obtained, or public commitment was obtained. In the latter case the names would be published in the local newspaper. It was found that those that agreed to the commitment publically saved much more energy than did the individuals that made a private commitment. In the latter case, even after the researchers indicated that their names would not be published, they continued to save energy. It can be seen then that even though their names were not publicized, merely asking for this permission created about a 15% reduction in natural gas use and a 20% reduction in electricity. It is also significant that these reductions could still be seen 12 months later (Pallak et al., 1980). This public commitment was perhaps so effective because of people's desire to be consistent. It can be tentatively concluded then that the more public a commitment is, the more likely it is that people will honor that commitment. In a study conducted by Lokhorst et al. (2013), the authors investigated why commitment is effective, and in order to find the answer, the authors first presented a meta-analysis of environmental studies that contained a commitment manipulation. Then, they investigated the psychological constructs that were possibly responsible for the commitment. They concluded that making a commitment leads to behavior change in the short and long term, especially when compared with controlled conditions. Thus, it can be hypothesized that commitment to saving energy through pledging is positively related to energy saving.

### *2.6 Role Model*

People can be highly influenced by their social surroundings, and this includes relatives, friends, colleagues, and others (Han et al., 2010). Grob (1995) also has stated that the differences that have appeared in environmental attitudes and behaviors may have been a result of social group memberships. Bush, Martin & Clark (2001) discussed the consumer socialization process through the use of social learning theory, and demonstrated that direct role models such as fathers, mothers, and others had the greatest impact on consumers' knowledge of the market and on their purchase decisions, especially with reference to the attitudes of young adults (Bush et al., 2001). Consumer socialization can be characterized as follows: a process according to which consumers increase their knowledge and skills, and form attitudes towards their purchases (Bush et al., 2001). It can also be seen that celebrity role models also create this kind

of social pressure, but this most often takes place with reference to the purchase of high-status and expensive products. Entertainers and athletes are also a good source of product information (Bush et al., 2001). Therefore, it can be hypothesized that having a role model for energy saving is positively related to energy saving.

2.7 Temporal Comparison

The temporal comparison theory defines temporal comparison in terms of when a person compares him/herself at two different points in time (Albert, 1977). Previous research on self-comparison feedback has revealed that the comparison of person’s achievements in the past with those in the present can be effective in terms of motivating a person to act, particularly when it is assumed that the previous consumption was less than in the present (Becker, 1978). This type of information can demonstrate the more obvious trends in behavior (e.g., energy consumption or frequency of physical activities) over wide-ranging periods of time. The users reflect on the reasons for their particular behavior and on its context. With reference to energy conservation, Fitzpatrick & Smith (2009) stated that such a comparison is often made along with exploration of the energy consumption data and increased awareness of normal everyday usage patterns. Moreover, a focus group study in the UK revealed that there was an “overwhelming preference for simple comparison of historical data” (Roberts et al., 2004). It follows that knowing what the current energy bill is compared with that of previous months can be positively correlated with energy saving.

3. Methodology

3.1 Sampling

The questionnaire used in this study was first tested with 7 MBA students in order to obtain a preliminary understanding of the content. This was followed by a pretest, where 7 eligible adult respondents at least 18 years of age were interviewed and were individuals that identified themselves as persons that saved energy at home. The questionnaire was revised based on the feedback from the interviewees in terms of its suitability and clarity, and then the main study was conducted interviewing 350 eligible shoppers at 14 shopping centers in Bangkok. The rate of energy savers was 76% and the response rate was 83%.

4. Data analysis

The benefits of saving money and helping to solve the global warming problem, as well as assuming energy saving as the person’s responsibility, knowing how to save energy, making a commitment to energy saving through pledging, having a role model for energy saving, and comparing the current energy bill with that of the previous month(s) were assumed to be positively related to residential energy saving. In order to investigate whether this hypothesis held true or not, a regression analysis was conducted. Specifically, the earlier-mentioned independent variables as well as the demographic characteristics, including gender, age, marital status, education, and household income, which were also used as the independent variables because they were used as the controllable variables, were regressed on energy saving, which was used as the dependent variable. It should be noted that education was divided into low education, consisting of people with lower than a bachelor’s degree, and high education, consisting of those with at least a bachelor’s degree. Household income was also divided into two groups: the low household income group was comprised of persons that earned less than 60,000 baht/month (1 US\$ = 33 baht at time of writing), whereas the high household income group was comprised of those that earned at least 60,000 baht/month.

5. Results and Discussion

The results of the multiple regression analysis are shown in Table 1.

Table 1. Results of Multiple Regression of Energy Saving on Its Determinants

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	1.567	.489		3.203	.001		
Save money	.230	.049	.240	4.735	.000*	.723	1.382
Global warming	-.063	.043	-.073	-1.449	.148	.724	1.381
Responsibility	.108	.046	.129	2.356	.019*	.621	1.611
How to save energy	.094	.048	.094	1.945	.053*	.794	1.259
Pledging	.236	.037	.358	6.451	.000*	.604	1.657
Role model	.006	.024	.011	.236	.814	.870	1.150
Temporal comparison	.062	.033	.093	1.861	.064*	.737	1.357
Gender	-.033	.092	-.016	-.353	.724	.947	1.056
Age	.002	.004	.028	.496	.620	.600	1.666
Marrygroup	-.065	.115	-.031	-.563	.574	.624	1.603
Educgroup	.137	.100	.065	1.371	.171	.818	1.222
Incgroup	-.102	.100	-.049	-1.015	.311	.797	1.254

R<sup>2</sup> = .42      R<sup>2</sup> = .40      F<sub>12,337</sub> = 18.99      P = .000      \* = Significant at α ≤ .1

It suggested that taken together, the 12 independent variables accounted for 42% of the variance in energy saving (R-square = .42). In addition, saving money, taking energy saving as one’s responsibility, knowing how to save energy,

commitment to energy saving through pledging, and comparing the current energy bill with the previous months had a positive influence on energy saving. According to the standardized beta coefficients, commitment to energy saving through pledging tended to be the most influential on energy saving, followed by saving money, taking energy saving as one's responsibility, knowing how to save energy, and comparing the current energy bill with that of the previous months. It is noteworthy that knowing how to save energy and comparing the current energy bill with the previous months' were more or less equally important in terms of energy saving. It should also be noted that multicollinearity was not a likely problem because the magnitude of the variance inflation factors associated with each independent variable was far less than ten (Wetherill et al., 1986).

Along with the standardized beta coefficient of the significant independent variables in the regression analysis, the mean values for the perceived performance of those independent variables are presented in Table 2. The mean values were taken from the seven-point anchoring scales, ranging from 1 meaning very little to 7 meaning very much.

Table 2. Importance and performance of drivers of energy saving

	Standardized Beta	Mean
Pledging	0.358	4.58
Save money	0.240	6.00
Responsibility	0.129	5.65
How to save energy	0.094	5.68
Temporal comparison	0.093	5.51

According to the importance-performance table (Table 2), the two most prominent drivers of energy saving were commitment to energy saving through pledging and saving money. It is noteworthy that although commitment to energy saving through pledging was the most important determinant of energy saving, Thais' commitment to energy saving through pledging is not as high when compared to their perception of money saving through energy saving in spite of its being second in importance as a driver of energy saving. Other drivers, namely accepting energy saving as one's responsibility, knowing how to save energy, and comparing the current energy bill with that of the previous months, were more or less equal in terms of the influence on energy saving.

According to the descriptive statistics, the strategies of Thais for saving save energy can be ranked from the most to the least used as follows: the first is rewards; the second is social comparison by providing information about their electricity utilization compared to their neighbors; and the last is the competition. Specifically, the mean values of these strategies were 5.21, 4.23 and 3.84 respectively and these strategies were measured on the seven-point scale from 1 meaning very little to 7 meaning very much. These results are in line with some previous studies. That is to say, some field studies have indicated that economic rewards (e.g., money or prizes) have been successful in reducing household energy consumption (Winett et al., 1978; Midden et al., 1983; McClelland & Cook, 1980; Petersen et al., 2007). Moreover, social comparisons can be an effective strategy in motivating people to save energy because it facilitates social learning about the individuals' optimal level of energy use (Cai et al., 2009; Munshi & Myaux, 2006). Comparative feedback demonstrates relevant social norms in favor of energy conservation—that is, it becomes clear that others are actively engaged in energy consumption as well. Some academic work has shown that providing social norm information induces people to conserve energy (Schultz et al., 2007; Nolan et al., 2008; Allcott, 2011).

## 6. Conclusion

The factors affecting residential energy saving in Thailand were found to be money saving, taking energy saving as one's responsibility, knowing how to save energy, commitment to energy saving through pledging, and comparing one's current energy bill with the previous months. Among these motivators of energy saving, commitment to energy saving through pledging and saving money are likely to be the most effective strategies in promoting energy saving at home. However, other candidate strategies for saving energy are taking energy saving as one's responsibility, knowing how to save energy, and comparing the current energy bill with the that of the previous months.

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# Evaluation of Principal Role on Building Teachers' Competence in Man Kendari, Southeast Sulawesi, Indonesia

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Received: October 1, 2017

Accepted: October 17, 2017

Online Published: November 28, 2017

doi:10.5539/ass.v13n12p132

URL: <https://doi.org/10.5539/ass.v13n12p132>

## Abstract

This study aims at analyzing the evaluation of principal's role in training teachers' competence in MAN 1 Kendari, Southeast Sulawesi Kendari. Subjects in this study are principals and teachers of MAN 1 Kendari. The research used descriptive method with qualitative approach. All the data collected by observation, interview and documentation and analyzed by data collection, data reduction, data presentation and conclusion. The result showed that the evaluation of principal role in building teachers' competence run well. In addition, the principal role as a leader trained the cooperation among administrators in the school, teachers and students' parents relates to students' education whether in the school or out of the school and socialization activities done by the teachers through teachers' group working (*Kelompok Kerja Guru / KKG*) to improve teachers' competence. As educator, the principal attempted to train the pedagogic competence and professional in terms of facilitating teachers to actively participate in KKG in order to improve teachers' ability in classroom management. In addition, as the supervisor, the principal trained teachers' pedagogic and personal in the classroom supervision activities, conducting meeting relates to the outcome of learning and instruction, arranging its scenario and the interaction process among teacher and students in the classroom.

**Keywords:** evaluation of principal's role, training of teachers' competence

## 1. Introduction

Act No. 20 of 2003 on National Education System Article 35 paragraph 1 explains that the National Standards consists of the standard content, processes, graduate outcomes, educational personnel, facilities and equipment, management, funding, and educational assessment, which should be improved systematically and regularly which aims to develop students' potentials to become a man of faith and piety to God Almighty, noble, healthy and responsible. Article 40 paragraph 2 of the Act also states that, educators and educational personnel have the responsibility to: a) create an meaningful, joyful, dynamic, and mutually interactive education environment; b) demonstrate professional commitment to the improvement of the quality of education; c) be the role model and uphold the reputation of their institution, profession, and position in accordance with the trust deposited in him (Depdiknas, 2004).

Based on the above Acts, the principal has a great responsibility in the management of the school and has a very important role in improving the quality of teachers through school programs. Likewise, Mulyasa (2013) states that in the line of duty, principal should have the institutional vision, a clear conceptual ability, and skill and art of human relations, mastery of the technical aspects and substantive.

In the efforts to improve the quality of national education, government, especially through *Kemendikbud* continuously tries to do a variety of changes and updates to the national education system. One of the efforts is associated with the teacher factor. Basically, the enactment of Act No. 14 of 2005 on Teachers and Lecturers and Government Regulation No. 19 Year 2005 on National Education Standards, is a government policy in which includes of government efforts to organize and to improve teachers' quality in Indonesia. Michael G. Fullan as cited in Suyanto and Asep Jihad (2013) suggested that change and reformation in education system is very dependent on the mastery of teachers' competence.

Moreover, teachers competences are now presumably still vary. Danim (2011) revealed that one feature of the education crisis in Indonesia is teachers do not have adequate ability to show their work performance. This suggests that teacher performance is not fully supported by an adequate degree of competence mastery. Hence, it is strongly need comprehensible approach to improve the teachers' competence.

Along with the lack of teachers' pedagogical, personality, social, and professional, it will have an impact on the less optimal learning in school. It is apparent from the results of preliminary observations made by researchers at MAN 1 Kendari, that is, students had not arranged and managed properly, there was the lack of an open view to allow students to develop an interest respectively, there were still lack programs which lead to the society and education advancement and there was still no breach of discipline, such as being as late to school, due to lack of efforts to be made by the principal in carrying out supervision and regular monitoring, moreover teachers' mentoring or coaching individually and classically had not scheduled properly.

Based on preliminary observations conducted at Madrasah Aliyah Negeri 1 Kendari, the head of the madrasah has not fully implemented his role as a fostering the development of competence to the teachers. This is due to busyness in carrying out other duties as head of the madrasah, so that adequate planning is required in the fostering of all aspects of the responsibility and the leadership of head madrasah can be done well. By implementing the tasks of heads of madrasah in various fields, it is necessary to do an adequate evaluation by the head of the madrasah of teachers and all staff within the scope of madrasah, especially related to the development of teacher competence in madrasah Aliyah Negeri 1 Kendari. It is important to do research on the role of head madrasah in developing teacher competence in MAN I Kendari.

Based on the above rationales, this study conducted to gain an overview of the evaluation on the principal's role in coaching teachers' competence of teachers in MAN I Kendari. The results of this study is very useful for the principals / madrasah in evaluating its role in developing teacher competence, especially teacher I MAN Kendari. In addition it is useful for teachers in an effort to develop their competence in order to improve the quality of education in general.

## 2. The Essence of Principal

According to Djafri, Novianty (2016), principal is the functional staff of teachers who is given task to lead a school where the learning process held or where there is interaction between teachers who give lessons and pupils who receive lessons. In institutional school, principle or more popularly known as the "teacher who received additional duties as head of the school." is one of the components that plays a role in improving education quality. As stated in article 12, paragraph 1 year 1990 that, principal responsible is for educational organization, school administration, coaching other education personnel, efficiency and maintenance of facilities and infrastructure. Therefore, a principal should prepare a particular strategy to improve his/her teachers' competency (Depdiknas, 2006).

Vannebo and Ottesen (2012) stated that leadership is currently seen as a guarantee for education quality and reform, as an essential component of building school capacity and as a major contributor to the transformation of practice.

The success of an educational institution is highly dependent on school leadership. Since the principal is as a leader in the institution, it has become a necessity for him/her to be able to bring the institution towards the achievement of defined objectives, to see the changes and the future in better globalization life. Principal should be responsible for the smooth running and success of all regulatory matters and the organizing formally or informally to his superiors to the people who have entrusted their children to the institution..

Based on the above explanation, it can be concluded that the principal is a teacher who is given the authority to direct the entire personnel in the school and has position as a determinant direction of the institution, set up all school programs, becomes carriers of the spirit of teachers' work and as the builders of culture for schools in improving the education quality.

According to Daryanto (2001), the duties and functions of the principal as educational leader as follows:

- a. School planning in the sense of setting school direction as an educational institution is by formulating the vision, mission, goals and strategies.
- b. Organizing school in the sense of making the organizational structure, assigning staffs and also assigning their duties and functions.
- c. Moving the staffs in terms of motivating staff through internal marketing and external marketing.
- d. Supervising in the sense of supervising, controlling and guiding all the staff and the school community.
- e. Evaluating the process and outcomes of education to be the basis of education and the quality of growth, as well as performing both analytical problem solving both systematically and creative problem solving, moreover avoiding and resolving conflicts.

In addition, Mulyasa (2003) suggests that one's leadership is closely related to the personality and as a leader, he/she will be reflected by (1) honesty; (2) self-reliance; (3) responsibility; (4) willing to take risks and decisions; (5) high-minded; (6) emotionally stable, and (7) exemplary.

The learning activities are at the core of the educational process. In line with this, teacher is the executor and main developer of the curriculum in schools. In tem of principal as an educator, Principals who demonstrates a high commitment and focuses on curriculum development and teaching and learning in school would be very concerned about the level of competency of the teacher, as well as he/she will always strive to facilitate and encourage teachers to continually improve their competence, so that teaching and learning activities can run effectively and efficiently.

As supervisor, to determine the extent to which the teacher is able to carry out learning, principal needs to regularly carry out supervision activities, which can be done through classroom visits to observe teaching and learning process directly, especially in the selection and methods used, media utilized and the involvement of students in the learning process (E. Mulyasa, 2013).

Jones et al. as presented by Danim (2011) argues that "the face of the curriculum which contains the changes is significant in the objectives, content, teaching methods and evaluation, naturally if teachers expect advice and guidance of their headmaster". It means that principal has to really master of the school curriculum. It will be impossible for a school principal who can provide advice and guidance to teachers, while he himself does not hang



well.

Therefore, the role of principal are coaching teachers' competence, managing curriculum development in teaching and learning activities, exercising leadership in the work as well as supervision, evaluation and reporting.

#### 1. Managing curriculum development in teaching and learning activities

Various ways in which school principals do to foster teachers' competence in schools curriculum development and teaching and learning activities such as by;

a. Helping teachers to prepare for the annual program, the semester program, weekly and daily and evaluating the curriculum implementation.

b. Helping teachers to create lesson plans and preparing teaching aids.

#### 2. Applying leadership in work, by;

a. Providing guidance for the assignment in this case, explaining the function direction in leading organizations as well as applying the guidance in the assignment.

b. Applying communication and cooperation in the work in this regard, explaining the meaning and function of communication in the work, explaining the meaning and function of cooperation in the work, and effective communication in the work as well as to reinforce cooperation among staffs in employment.

c. Providing motivation to the staff and employees in this respect and encouraging staff to constantly develop themselves through the provision of books, training and further education.

d. Chairing a meeting in this regard, continuing meeting according to the agreement.

#### 3. Supervision, evaluation and reporting, by;

a. Carrying out supervision in this case guiding teacher, teaching insight / knowledge and implementing feedback from the results of supervision.

b. Evaluating the activities / programs in this case, carrying out monitoring of activities / school program, carrying out evaluation activities as well as implementing the feedback of the evaluation results.

c. Reporting; in this case, collecting material and reporting the activity.

#### Teachers' Competence

According to Mulyasa (2012), teacher competence is the combination of personal ability of science and social technologies which are generally establish teachers' standards competence of the teaching profession, including of materials mastery, understanding the learners, and learning educational, personal and professional development.

McLeod (1990) in the Suyanto and Jihad (2013) define competence as rational behavior to achieve the objectives required in accordance with the conditions expected. Teachers' competence themselves are the teachers' ability in implementing the obligations of responsible and worthy in stakeholders' view.

According to Louise Moqvist (2003) in Suyanto and Jihad (2013) suggested that someone had called being competence if he/she can do what should be done well. Hence, a teacher can be said that she/he has the competence to teach if he/she is able to teach their students well.

In addition, Len Holmes (1992) in the Suyanto and Jihad (2013) argued that competence is basically a description of what a person can do the work as well as any form of such work can be seen. To be able doing a job, a person must have the ability in the form of knowledge, attitudes and skills which are relevant to his/her field of work.

Majid (2005) describes that competencies possessed by each teacher will demonstrate teaching quality. Competence will be materialized in the form of knowledge and professional mastery in performing one's function as a teacher. In line with the Finch & Crunkilton (1979), in Mulyasa (2003), competence defined as mastery of an assignment, skills, attitudes, and appreciation to support successfulness.

Based on the above definition of competence, teacher's competence can be defined as the ability to be possessed by a teacher in carrying out his/her duties and responsibilities as educator to make changes to certain subjects comprehensively in accordance with the expected conditions.

#### Dimensions of Teacher Competency

##### 1. Pedagogic Competence

In Law No. 14 Year 2005 about teachers and lecturers, it states that pedagogical competence is the "ability to manage the students' learning". Ministry of Education (Depdiknas) (2004) calls this competence with a "competency management of learning and competence preparation lesson plan includes: of being able to describe the purpose, being capable of selecting material, being able to organize the material, determining the methods and strategies, learning resources or media in learning, compiling tools assessment, determining the valuation techniques, and being able to allocate the time as well as implementing the learning process such as, opening lessons, presenting the material, using the media and methods, using props, using communicative language, motivating students, organizing activities, interacting with students communicatively, summing up the lessons, giving feedback, and conducting the assessment, as well as the using of time effectively.

Those competencies can be seen as the ability to plan teaching and learning program, to implement or manage the interaction, and to make an assessment. According to Suyanto and Jihad (2013), pedagogical competence that must be mastered by teachers include teacher's understanding about his/her students, the design and implementation of learning, evaluation of learning outcomes, and the development of students to actualize their potential. In detail, each competence has essential indicators as follows:

- a. Understanding students in depth. In this case, teacher understands the students by using principles of cognitive development; utilizing the principles of personality; and identifying the provision of students' prior knowledge.
- b. Designing learning, including of comprehending the educational foundation for the sake of learning, by essential indicators, they are to understand the foundation of education; to apply the theory of teaching and learning; to determine the learning strategies based on student characteristics, to determine the competence to be achieved, and teaching materials; and to develop a lesson plan based on the strategy chosen.
- c. Implementing the learning itself. The essential indicators used are setting the foreground-background learning and implementing a conducive learning.
- d. Designing and implementing an evaluation of learning by essential indicators which include of designing and implementing an evaluation process and learning outcomes on an ongoing basis by various methods; analyzing the results of the evaluation process and learning outcomes to determine mastery learning; and utilizing the results of learning assessment to improve the quality of learning programs in general.
- e. Developing students to actualize their potential. The essential indicators used are facilitating students to develop various academic potential; and facilitating students to develop a range of non-academic potential.

## 2. Personality Competence

According to Hall and Lindzey (1970) in Suyanto and Jihad (2013), they suggested that individual's personality is a series of events and characteristics in the overall life and reflects on the elements of behavior repetitive, and unique. Therefore, personal competence for teachers is the personal capabilities that reflects the personality steady, stable, mature, wise, noble and dignified, and can be a role model for students. In detail, this competence consists of:

- a. The personality steady and stable by essential indicators, such as acting according to the norm of law; social norms; being proud as a professional teacher; and having consistency in acting in accordance with the norms prevailing in life.
- b. Mature personality. The essential indicators are showing the independence attitude as an educator and having a high work ethic.
- c. Personality wise. The essential indicators consist of displaying the actions based on the, students' benefit, schools and communities and demonstrating openness in thinking and acting.
- d. The noble morals and can be as an example. Here, the essential indicators are acting in accordance with the norms of religion, faith and piety, honest, sincere, helpful, and having exemplary behavior as the model for students.
- e. an authoritative personality. The essential indicators consist of: having a positive effect on students behaviors and respected.

In the law about teachers and lecturers, it states that personal competence is the "ability of a stable personality, noble, wise and dignified as well as being exemplary of learners".

## 3. Social Competence

According to the Law on Teachers and Lecturers, social competence is "a teacher's ability to communicate and interact effectively and efficiently with students, fellow teachers, parents / guardians of students and the surrounding community".

While Surya (2003) suggests that social competence is required by one's ability to succeed in dealing with others. Social competence includes of skills in social interaction and fulfill its social responsibility.

Teacher social competence is one of the powers or the teacher's ability to prepare students to be good members of society as well as the ability to educate and guide the community in the face of life in the future. To carry out the role of civil society, teachers must have competencies, such as:

- a. The normative aspect of education, that is to be a good teacher is not enough depend on teacher's talent, intelligence, and skill, but also must
- b. act in good faith so that it is linked to the norm which is as foundation in performing their duties, considerations before selecting a professorship, and
- c. Having a program that leads to the advancement of society and the advancement of education.

Suyanto and Jihad (2013) state that social competence that must be possessed by teachers are:

- a. Ability to socialize and communicate effectively with students. Its essential indicators are: communicating effectively with students and understanding students' desires and expectations.
- b. Ability to communicate and interact effectively with fellow educators and education personnel, for example, teacher can discuss the problems faced by students as well as the solution.

c. Ability to communicate and interact effectively with parents or guardians of students and the surrounding community. For example, teachers can provide information about the talents, interests, and abilities of students to the parents.

Based on the above explanation, teachers' social competence is reflected through the indicators in case of teacher interaction with students, the principal, colleagues, parents, teachers and interaction with the community.

#### 4. Professional Competence

According to Suyanto and Jihad (2013), they argue that professional competence is the mastery of learning materials is broad and deep to teachers mastery includes of curriculum subjects at school and substance of knowledge that overshadow the material, as well as mastery of the structure and methodology of science. Each competence has essential indicators as follows:

a. Mastering scientific substance associated with the field of study. This means that teachers must understand teaching materials in the school curriculum; understand the structure, concepts and methods of science that houses and coherent with the teaching materials; understand the relationship concept between subjects; and apply the concepts of science in teaching and learning.

b. Mastering the structure and the scientific method implies that teachers must master the steps of research and critical studies to deepen the knowledge or teaching materials.

c. Ability in organizing teaching and learning process

d. The willingness and ability to develop professionalism and personality in a sustainable manner.

Merriam (1989) as cited by Suyanto and Jihad (2013) suggests that professional competence that must be possessed by teachers are:

- a. Understanding the motivation of the students.
- b. Understanding students learning needs.
- c. Having sufficient ability of the theory and practice.
- d. Determining the needs of the user community education.
- e. Having the ability to use a variety of methods and techniques of learning.
- f. Having listening skills and communication (oral and written).
- g. Knowing how to use the material taught in the practice of real life.
- h. Having an open view to allow students to develop their interests respectively.
- i. Having a desire to continue and to enrich their knowledge and continue their studies.
- j. Having ability to evaluate a teaching and learning program.

Likewise, Law No. 14 Year 2005 on Teachers and Lecturers states that professional competence is the "ability of mastering the subject matter is broad and deep". In addition, Muhammad Surya (2003) says that the professional competence is a wide range of capabilities required in order to realize himself as a professional teacher. Professional competencies include expertise or skill in the art of mastering materials which should be taught along with the method, a sense of responsibility in his work and a sense of community with other teacher colleagues.

In line with that, professional competence of teachers includes the ability in terms of:

- a. Understanding and being able to apply a good educational foundation philosophical, psychological, and so on,
- b. Understanding and applying the theories learned in accordance with the level of development of learners behaviors,
- c. Being capable of handling the subject or field of study that is assigned to him,
- d. Understanding and being able to apply the appropriate teaching methods,
- e. Having ability to use a variety of subjects and media as well as other learning facilities
- f. Having ability to organize and implement the teaching program,
- g. Having ability to carry out the evaluation of learning and
- h. Having ability to motivate learners.

Depdiknas (2006) adds that professional competence includes of professional development, understanding of knowledge and mastery of academic study.

### 3. Research Methods

This study conducted on March until May 2016, at MAN I Kendari, Southeast Sulawesi, Indonesia. This research was descriptive qualitative approach which aims to provide an overview evaluation of the Principal's role in developing Master's competence in MAN I Kendari City. The subjects of this study is the Principal, and teachers who are in MAN I Kendari City. Determination of the subject of this study was conducted purposively to the teachers and the head of the madrasah. Some of interviewed teachers have similar views results in assessing and observing the head of madrasah in carrying out the role and guidance of teacher competence MAN 1 Kendari. As responsible for education in schools /

madrasah, Head of madrasah realizes his role in fostering all staff and teachers, while the teachers of MAN I Kendari realize the importance of developing professional competence in efforts to improve their self quality and the quality of education generally. Data collection techniques used were observation, interviews, documentation and triangulation. The data analyzed by reducing, presenting and drawing conclusions. Miles and Huberman (1992) Collecting the data used in order to collect as much information in accordance with the purpose of research, and then perform data reduction is that the data obtained is written in the form of reports or detailed data. The report is based on data obtained reduced, summarized been the subject matters, which focused on the important things. After reducing the data, the next step is to present the data in the form of narrative text, and then doing a conclusion.

#### 4. Results and Discussion

##### A. Description of Research Results

Coaching of teacher competence as a whole is divided into four aspects: Teachers Working Group (KKG), supervision, education and guidance through the program of cooperation between teachers and students' parents. All these aspects are translated into the sub aspects defined as interview guides in the form of unstructured questions. In order to reveal the principal's role in the evaluation of coaching competence of teachers, researchers compiled 8 points of the question. The results of interviews conducted by the author described as follows:

##### a. Evaluation of principals development as leader to social competence of teachers' in MAN I Kendari

Evaluation of the role of the principal as leader (leader) is a role that must be understood and controlled by principals in their role as leaders in order to foster the teachers' creativity as well as to encourage their improvement both a task-oriented leadership and oriented school personnel.

According the results of interviews, the principal of MAN I Kendari argued that "to build competencies social teacher, I always apply a few activities that can establish communication and good cooperation between teachers, parents and fellow teachers such as conducting KKG (group working of teachers), and then socialization between teachers and parents are usually done at certain times, as well as cooperation among teachers in doing the tasks assigned by the Principals." (Ma'sud Ahmad, M.Pd., interview on April 20, 2016)

Based on data collection and interviews, it can be concluded that the principal has been exerting leadership in his work by implementing the communication and cooperation in the work in this regard, explaining the meaning and function of communication in the work, cooperation in the work, applying effective communication in work as well as reinforcing cooperation between teachers in the work, providing motivation to the teachers in, encouraging teachers to constantly develop themselves through the provision of books, training and further education as well as leading the meeting and following up the meeting results according to the agreement. The headmaster was a builder who must always be ready to build a good social interaction between teachers through coaching-training activities within the school and outside of school.

##### b. Evaluation of principal for educator development in mastering the competencies

Principal is not only as a leader but also as an educator for teachers, who aimed to show the commitment and focused on curriculum development and teaching and learning in school.

##### c. Pedagogic Competence

Various ways had been done by principals in fostering teachers' competence in schools curriculum development and teaching and learning activities, such as facilitating and encouraging teachers to prepare the annual program, the semester program, weekly and daily and evaluating the implementation curriculum. Then facilitate teachers to create lesson plans and preparing teaching aids.

According to the interview, the headmaster pointed out that "in terms of fostering teachers pedagogical competence, principal organized activities that can improve the ability of teachers to manage teaching materials such as including teachers in the development and training of KKG and training in schools, and through some assignment performed by the principal. (Zulrahmad, S.Pd.M.Pd. interview 22 April 2016).

From above description, the researchers concluded that in order to guide the pedagogical competence of teachers, principal conducted coaching in schools as fostering teachers' ability to manage material through duty provision for teachers to create learning programs such as the annual program, the semester program, weekly activities planning and daily activities lesson plan, not only to maximize the ability of the principals involved several coaches to develop these competencies through KKG (working group of teachers) is done once a month at the school, in carrying out its role, the principal also developed the ability to follow the activities of PSC (Principals working Group), schools and the entire contents likened to a tree then the principal as its roots, when the roots are able to absorb water and nutrients properly, then the trees will grow well and produce high quality of fruit.

##### d. Professional competence

In terms of professional competence, according to the interview result by asking the teachers, the informant said, "the principal always eagers to motivate teachers to develop professional capabilities in this case the ability to master the material that will be taught through the opportunity to continue their studies, provides the guide books on learning program useful for future support for the teachers' career and particularly to avoid mistakes in teaching. (Asniati,

S.Pd.M.Pd., interview 25 April 2016).

Based on data collection, the researchers concluded that in fostering the ability of mastering the learning material, principals provided motivation and facilities in this case involving some campuses that teachers who had not graduated to magister degree to continue their studies and gain knowledge as well as the provision of books and principal to add insight and new knowledge for teachers, as well as to evaluate the implementation of curriculum and learning activities to teach well, so the teacher does not make mistakes in teaching due to maturity in mastering the material since the teacher described as a painter in the school and the students are painting to that can attract and can be enjoyed by many people then it all depends on the artist. Therefore, in order to produce qualified teacher, they must have a mastery of materials and methods to create a quality learners.

e. Evaluation of development principal as supervisor on teacher competence in MAN I Kendari

Evaluation of principal's role as a supervisor whose purpose is to conduct surveillance at regular intervals on the course of the learning process, such as supervising teacher at the ability to manage teaching materials, the ability of interaction between teachers and students as well as the ability of teachers in understanding the characteristics of students in receiving learning materials so that the learning process will be fun for students.

f. Pedagogic competence

In accordance with the results of interviews and collecting data that researchers got from the informant, it was found that the principal suggested that "performing principal role as a supervisor in fostering the pedagogical competence is through classroom supervision and superintendent at certain times which aims to know how much the teacher's ability to manage learning materials "(Ma'sud Ahmad, S.Pd.M.Pd., Interview on April 20, 2016).

g. Professional competence

Based on data collection and interviews that the authors obtained from informants, that the principal suggested that "to foster the professional competence of teachers is better done through classroom supervision that aims to determine the extent to which a teacher's ability in mastering the material and deliver material as well as the allotted time needed to teach ". (Ma'sud Ahmad, S.Pd.M.Pd., Interview on April 26, 2016)

h. Personality competence

Based on interview, the informant as the principal said that "to carry out his role as a supervisor, in fostering the personal competence of teachers is through the implementation of classroom supervision is carried out during the learning progress every day, such as the ability to comply with the rules of the school, especially teaching discipline in order to be a good role model for students. (Ma'sud Ahmad, S.Pd.M.Pd., Interview 27 April 2016)

Hence, in fostering the three competencies, the principal supervised lessons during the learning process which aims at monitoring classroom activities, such as a teacher's ability to manage the learning materials, to make lesson plan, to engage students in classroom activities as well as the ability to bring themselves within the school environment, especially in the classroom such as understanding students' characteristics so that he can tailor the learning materials to the student's interest in learning. Through classroom supervision, principal may know the strengths and weaknesses that are owned by the teachers in the school, through the advantages and disadvantages that will be as an evaluation and report to the school administration through some books like teachers supervision and books supervision from guide book. Form of evaluation by Principals as provide understanding and assignment to a teacher through the organization of the meeting, whose purpose is to discuss the advantages and disadvantages that a teacher, the results were obtained from classroom supervision activities.

In addition, another informant said that "in performing his role as principal, to provide guidance to the teachers competence, principal did not find or had constraints due to the teacher merely following the programs organized naturally by the school, since the problems that occurred also at the time of implementation in the classroom, and the form of coaching is just supervising lessons. (Drs.Muis, M.Si., interview 29 April 2016).

Based on the result, it show that the principal did not find some obstacles, it is due to the coaching program is natural or run away, since the principal believes the teachers strongly understand about the coaching programs.

B. Discussion

In accordance with the results the obtained data and information on the competence of teachers in MAN I Kendari as follows:

1. Pedagogic Competence of teachers at MAN I Kendari

According to the results of interviews that the author got from informants, Ma'sud Ahmad, M.Pd. Head MAN I Kendari noted that to develop pedagogical competence of teachers, headmaster always provided motivation for teachers to continue their education, follow KKG, motivate them to read books, provide insights and new knowledge for teachers in managing learning materials then join meetings done once a week. "(Interview on 29 April 2016).

Principal's statement above is supported by Mudair, M.Pd. as a teacher who argued that, "teachers at MAN I Kendari, have been able to manage the learning program well. I do my thanks to the motivation accompanied by the principal as an educator". (Interview on May 1, 2016). It is supported by school personnel as the informant's, namely Drs.Muchsin Baharuddin, M.Pd. who suggested that "teachers have been able to manage such learning programs, developed

curriculum, developed the theme, as well as some devices in making learning media and materials through KKG". (interview on May 4, 2016).

According to Raka (1984), he suggests that competence is the ability to plan teaching lesson plan includes of organizing teaching materials, planning the management of teaching and learning activities, classroom management plan, planning the use of media and teaching resources; and student achievement assessment plan for teaching benefit.

Whitney's study (2012) explains that the influence on teacher leadership is an attitude of inquiry and horizontal relationship orientation with teachers, where both of them can reduce anti-collaborative to the differences of power effect that exist in across institutional job. In this case, the principal has the task of carrying out his functions, both functions related to the educational goals achievement and conducive school climate creation to the implementation of effective and efficient teaching and learning process.

Based on description above, the researchers revealed that conducting training on the pedagogical competence of teachers is through some of the efforts made by the Principal in carrying out his duties and functions as a driving force in terms of motivating teachers through the activities and efforts to develop competencies in particular teacher's pedagogic competence. These activities can help and provide convenience for teachers to teach and have the ability to manage learning programs such as, how to develop and create a learning tool as well as a good classroom management.

## 2. Personality competence of teachers in MAN I Kendari

According to the results of interviews the authors obtained from informants, namely Asniati S.Pd.M.Pd. as deputy principal curriculum in MAN I Kendari, she noted that to conduct training for the competence of teacher's personality, the headmaster had to supervise, control and guidance to some of the teacher's behavior as behavior that steady and stable, mature attitude, personal wise, noble and can be the role models for students and personal dignity through his role as a supervisor. "(interview on April 30, 2016)

The statement was supported by Drs.Muis, M. Pd as teacher in MAN I Kendari who argued that, teachers are being monitored every behavior conducted in the school, especially behavior that leads to discipline in carrying out the task. "(Interview on May 5, 2016)

The statement was supported by Dr.Zulrahmat, S.Pd.M.Pd. as one of the teachers in MAN I Kendari. He argued that "in carrying out the task, the principal always be discipline, especially in teaching, in the event of violation, and the principal way in giving punishment". (Interview on May 10, 2016)

In line with that, Surya (2003) calls this personal competence as personal competence, that is, the ability of a teacher personally in order to become a good teacher. Personal competence includes of personal capabilities with respect to understand self-acceptance, self-direction and self-realization. While the teacher competence is more particularly be empathetic, open, authoritative, responsible and able to assess the teacher personally. Meanwhile, according to Arikunto (1993), personal competence requires that teachers have a solid personality to become the source of inspiration for the subject, and exemplary student.

Hartley's research (2007) suggests that the emergence of leadership has been characterized by supporting evidence, there is little evidence of a direct causal relationship between leadership and students.

Hence, in an effort to provide guidance to the competence of the teacher's personality, the principal guide the teachers' competence by applying several rules as a teacher. Based on this rule, teachers in MAN I Kendari always be active and on punctual for their presence in the school.

## 3. Professional competence of teacher in MAN I Kendari

In accordance with interview of Drs.Mudair M.Pd as one of the teachers of MAN I Kendari, he stated that "to direct the professional competence of teachers, principal conducted classroom supervision on scat learning process takes place, which aims to monitor the teaching and learning process in terms of identifying teachers' ability to master the material that will be taught ". (Interview on April 2, 2016)

The above statement is supported by Baharuddin Drs.Muchsin as the teacher in MAN I Kendari. He said that "teachers already have the ability to master the material that will be taught to the students, in accordance with professionalism by always reading books and actively follow KKG" (Interview on May 6, 2016)

The two statements above are supported by the next informant namely, Drs.Muis M.Pd as the teacher in MAN I Kendari. He revealed that "to be able to support their work in the future as well as to have the ability in mastering the material to be taught, the teachers in MAN I Kendari are always ready to carry out the direction given by Principal. It is done by motivation teachers to pursue their education and has always actively read and seek knowledge through the facilities provided by the headmaster as reference books in the school library ". (Interview on May 7, 2016)

Idochi and Amir(2004) states that the professional capabilities include of subject mastery and the basic concepts of science nautical taught and appreciation of grounding and insight into education and teacher training, as well as mastery of the processes of education, teacher training and student learning.

Moreover, Arikunto (1993) says that the professional competence requires teachers to have a broad knowledge of the subject matter and the field of study that will be taught as well as mastery of the methodology that is mastering

theoretical concepts, choosing the appropriate method and being able to use them in the learning process.

The Valentin and Prater (2011) principal leadership have some behaviors, promote instructional and curriculum improvements related to academic achievement in transformational leadership and identify vision and provide the right model for the greatest achievement

Teachers in MAN I Kendari according to the recent study show that they were able to carry out their duties and obligations professionally. It is based on the principal efforts to maximize the teachers' potential, through several attempts in motivating teachers to continue his studies for teachers who have not completed their studies to the master degree, the provision of guidance based on the results of classroom supervision conducted by the principal and assisted by some review activities of supervisors as well as the availability of reference books to teaching and learning for teachers. Here, the researchers state that the teachers in MAN I Kendari always tried to continue learning and developing their skills in understanding the learning programs through the development of the principal in order to provide qualified teachers. Moreover, it will affect the next generation by good character in competitive era of today.

#### 4. Social Competence of teacher in MAN I Kendari

In accordance with the results of teacher social competence, the researchers interviewed the informant, namely Asniati S.Pd.M.Pd., She argued that "for supervision to the teachers' social competence, the principal applied his leadership in the work to establish some social activities in which include of some activities by cooperation between teachers and students' parents, joining KKG, cooperation among teachers with colleagues so they can discuss about the problems faced by students and provide a solution, as well as activities in the promotion of social interaction between teachers and students which held once a month at MAN I Kendari ". (Interview on April 25, 2016)

The above statement is supported by the statements of informants, namely Drs.Mudair M.Pd who said that "through such activities the teachers have been able to interact with parents to inform each other about their children situation when they are at school or at home, with teachers and parents. That such information would greatly help in understanding the students' characteristics so that there is a good cooperation in providing education for children". (Interview on May 11, 2016)

The two statements above are supported by the next informant, namely Dra.St.Aminah M.Ag as one of teachers in MAN I Kendari. She revealed that "teachers in Kendari MAN have been able to get along and communicate effectively with students, for instance to communicate effectively with students. Therefore, teachers can understand students' desires and expectation and be able to communicate and interact effectively with fellow educators and education personnel, such as, teachers can discuss the problems faced by students and provide the solutions ". (Interview on May 13, 2016).

In addition, Johnson as cited by Idochi and Amir (2004) states that social skills include the ability to adapt the demands of work and the environment at the time when he brought his duties as a teacher. Likewise, Arikunto (1993) suggests that social competence requires teachers to have good social communication skills with students, fellow teachers, principals, employee administration, even by members of the public.

Hall, Gunter, and Brogg research (2012) the official development and discursive practices normative related to the leadership and potential for ideological social control of teachers examining in social, cultural and political environments.

Hence, social competence of teachers can be fostered by principal in training teachers in leadership in the work to organize several activities that make up the interaction between teachers and students so that teachers can understand the desires and expectations of the students in the learning process in school. They also can interact with the principal and colleagues, teacher interaction with parents, teachers and interaction with the community so that teachers can provide information about the talents, interests, and abilities of students to their parents.

From the above description has been the author presented, the researchers state that the teachers in MAN I Kendari have been able to interact well in school and in society, it is useful to improve their ability to be more socialize, because creating good teamwork starts from the good social relationship.

#### 5. Conclusion

Evaluation of the principal role in fostering teachers' competence in MAN I Kendari run well, as reflected in the role as leader. (1)The principal provided guidance related to the cooperation between school personnel, especially teachers, and students' parents related to education for students both at school and at home as well as socialization between teachers of MAN I with other teachers from different school through KKG (working group of teachers) which aims to improve the social competence of teachers in MAN I Kendari. (2) Meanwhile, in role as educator, headmaster attempted to do some coaching of pedagogical competence and professional competence in the provision of facilities for continuing education, provision of guide books for teachers about the learning program and facilitated teachers to participate actively in KKG that aims to enhance the teacher's ability to control and manage learning materials properly, (3) then the role of supervisor (supervisor) was in carrying out his role as supervisor of the principal by fostering pedagogical competence and personality in the form of activities to supervise the class, held a meeting related to the results of supervision activities of the learning process, preparation of learning programs as well as the interaction between teachers and students in the classroom, and coaching teachers through the school rules in this case giving

reinforcement through reward or punishment for the teacher when they were in violation of these rules.

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# Identification of Building-Surrounded Obstacle Parameter Using Automated Simulation to Support Building Integrated Photovoltaic (BIPV) Layout Planning in Thailand

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Received: October 3, 2017

Accepted: October 16, 2017

Online Published: November 28, 2017

doi:10.5539/ass.v13n12p142

URL: <https://doi.org/10.5539/ass.v13n12p142>

## Abstract

The overall aim of this study was to explore the comparative effects between obstacle's distance and obstacle's orientation parameters that cause partially shading effects and influence the potential solar power generation of a photovoltaic (PV) system. An automatic collaboration of a BIM authoring software and a cloud-based building performance analysis tool were used to simulate the annual cumulative insolation obtained from rooftop PV surfaces of eight different orientations and forty-three different distances between the BIPV and building obstacle. Two public healthcare buildings, an OPD and a ward building that widely established throughout Thailand were our case study. This study also explores that orientation and distance of a surrounding obstacle are both important parameters that influencing the annual cumulative insolation of PV surfaces but in the different contexts. The findings of this study also support decision making for BIPV designers and planners to acknowledge which the BIPV and the obstacle placement is highly effective, and which one is encountering a problem and its solution.

**Keywords:** surrounding obstacle, partial shading effect, building integrated photovoltaic, automated simulation, obstacle's orientation, obstacle's distance

## 1. Introduction

### 1.1 Introduction of the Problem: Building Integrated Photovoltaic (BIPV)

The sun is the widest and huge amount of expansive energy source. The potential for solar energy to make a significant contribution to global electricity demand has been widely recognized and solar photovoltaic (PV) is considered as a major contributor to solar energy supply (Ekici, 2014; Yang, 2015). Photovoltaic systems are one of the most beneficial plants in this clean electricity production which is easy to install in and apply to a building and an urban environment. Building integrated photovoltaics (BIPVs) are solar PV materials that replace conventional building materials in parts of the building envelopes, such as the rooftop or walls, that serve as building envelope material and power generator simultaneously. Additionally, the BIPV technology also reduces the total building cost and mounting cost as BIPV panels serve as building components (Shukla, et al., 2016; Hong, Lee, Koo, Jeong, & Kim, 2017; Tripathy, Yadav, Sadhu, & Panda, 2017). Apart from attaining optimum technique and aesthetic solutions. Other key factors to achieve wide-scale implementation of BIPV involve minimizing the production costs, reducing the environmental impact and especially increasing the final efficiency of the system (Mulcué-Nieto & Mora-López, 2015). The efficiency of any BIPV systems can be estimated by solar insolation, i.e., a measure of solar radiation energy received on a specific PV surface area at a given time. Solar insolation is affected by factors such as atmosphere, angle of the sun and distance. The thinner the atmosphere in which the sun is passing through, the higher degree the insolation. The insolation of an area determines how much energy a square meter of solar panel can provide on any given day. When the insolation rate of an area is low, more area of panel is required to maximize energy output (Sinovoltaics, 2014). A BIPV system directly converts sunlight into electricity so it is sensitively affected with the change in the intensity of solar radiation. These fluctuations cause troubles between demand and supply and reduce the power quality (Ekici, 2014). Main challenging issues about BIPV applications including partial shading, incorrect specifications of the BIPV systems, non-optimal tilt and azimuthal deviations are commonly encountered: therefore, the importance of these technical performance issues is indisputable, particularly in designing processes (Lam, Close, & E.W.C., 2006; Celik, Karatepe, Silvestre, Gokman, & Chouder, 2015; Yang, 2015; Zomer & Rüter, 2017).

### 1.2 An Introduction to the Partial Shading Effects

PV system performance is significantly affected by the environmental and surrounding factors which involve; surrounding-reflected radiation and shading effects of the environmental obstacles (Yoo, 2011; Celik, Karatepe, Silvestre, Gokman, & Chouder, 2015). The available total solar irradiance on PV modules is composed of three components: beam (direct), diffuse from sky, and surrounding-reflected components. Beam radiation is the component directly comes from the sun without being scattered through the atmosphere but diffuse radiation is highly scattered by

different types of particles of clouds, dust or haze in the atmosphere. Beam radiation calculation is purely geometric and directly dependent upon the solar geometry—azimuth and altitude, straightforwardly. On the other hand, surrounding-reflected radiation is a complicated factor which is structurally formulated by both beam and diffuse radiation reflected from the surrounding such as nearby buildings and ground, and reach the PV module again. The surrounding-reflected radiation also depends on many factors such as surrounding reflectance, absorptance, emittance, and transmittance which influences the incidence solar irradiation on the PV modules (Yoo, 2011; Gökmen, 2016).

Practically, one of the most significant and complicated effect in dealing with BIPV performance estimation is the partial shading effect on PV modules due to the surrounding obstacles, it plays important role in the efficiency of PV systems by their convoluted, non-uniform and dynamic conditions, especially when the PV system locates in a dense urban environment. Partially shaded PV modules receive less solar radiation than the unshaded PV modules and partial shading effects may cause irreversible damage to the module due to the hot spot effect. The surrounding obstacles including trees, utility poles, surrounding buildings and so on, furthermore, only the building itself on which the system is integrated is responsible for approximately 5-10 % decrease of the overall BIPV performance (Celik, Karatepe, Gokman, & Silvestre, 2013; Masa-bote & Caamaño-Martín, 2014; Frontini, Bouziri, Corbellini, & Medici, 2016; Zomer & Rütther, 2017).

To acknowledge the impacts of the shadow that project on the surfaces of a PV system, examination of three main conceptual parameters are required including (A) solar properties, (B) surroundings, and (C) related-BIPV which are described as follow (Yoo, 2011; Celik, Karatepe, Gokman, & Silvestre, 2013; Masa-bote & Caamaño-Martín, 2014):

(A) The parameter of solar property includes (A-1) the sun altitude, (A-2) azimuth angle, and (A-3) solar irradiation. The radiant energy from the sun is measured and reported as the solar irradiance, it is a crucial parameter using for calculating the solar insolation of PV modules (Zeil, 2017).

(B) The parameter of surroundings consists of two subcategories; (B-1) the parameter of surrounding-reflected radiation and (B-2) surrounding obstacle. The parameter of surrounding-reflected radiation includes (B-1-1) reflectance, (B-1-2) absorptance, (B-1-3) emittance and (B-1-4) transmittance as previously described, while (B-2) the parameter of a surrounding obstacle comprises of (B-2-1) obstacle's location, (B-2-2) obstacle's shape, and (B-2-3) obstacle's orientation, (Figure 1). The surrounding obstacles block and eliminate the beam element of the solar radiation from fully hitting on a PV surface. The projected shadow from the three-dimensional coordinates of the obstacle on PV surfaces determined by the solar azimuth and solar altitude angles that dynamically change all the time during day. The dynamical variation makes the parameters of a surrounding obstacle one of the subtlest factors; however, clarification of such parameter assists in a more accurate estimation of partial shading effects.

(C) The parameter of related-BIPV consists of two subcategories: (C-1) the parameter of a PV surface geometry includes (C-1-1) PV surface orientation, (C-1-2) PV surface tilt angle, (C-1-3) PV surface shape, and (C-1-4) PV surface location, these four parameters are illustrated, in relation with the parameter of a surrounding obstacle, in Figure 1. (C-2) the parameter of a PV module properties comprises of (C-2-1) PV materials, (C-2-2) BIPV product type, and (C-2-3) BIPV system type. PV materials which are semiconductors create voltage and current from movement of electron between anode and cathode poles to generate electricity. There are two broad categories of PV cells technologies—Crystalline Silicon and Thin Film. Crystalline Silicon cells gain the majority of market share at almost 90 percent of the world's PV materials and they provide efficiency of 12-16% (Chaianong & Pharino, 2015; Shukla, Sudhakar, & Baredar, 2016). BIPV products are classified into five main categories including: (1) BIPV's foil products, (2) BIPV's tile products, (3) BIPV's module products, (4) BIPV's solar cell glazing products and (5) building attached photovoltaic (BAPV) products. In the current BIPV market application, about 80% of BIPV installations are rooftop mounted, while the remaining 20% are façade mounted. Rooftop solar PV systems generally and practically meet requirements of most cases where ground space is limited and unused large roof space is available.

Similarly, in Thailand, many BIPV end-users have gained greater interest in the solar rooftop technology especially rooftop BIPV's module products due to their high efficiency performance, competitive pricing among suppliers, easily applicable and suitable for pitched roofs. The rooftop BIPV solar PV module products may be somewhat similar to conventional solar PV modules. The difference, however, is that the BIPV solar modules are made with weather skin solutions (Jelle, Breivik, & Røkenes, 2012; Chaianong & Pharino, 2015; Shukla, Sudhakar, & Baredar, 2016). A BIPV system—(C-2-3) is considered as building integrated energy storage system which is comprised of a charge controller, a power storage system, power conversion equipment including an inverter, and it may include backup power suppliers such as diesel generators (Strong, 2011; Biyik, et al., 2017).

As previously mentioned, the projection of shadow on the PV modules has been determined by using the three-dimensional coordinates that derived from the parameters of the surrounding obstacle which are determined by solar azimuth and solar altitude angle that constantly change through time. The projection of shadow on PV modules directly determines the shaded PV surfaces, shown in Figure 2, that have been dynamically and continuously changed by the movement of the sun.

Figure 3 illustrates an example of dynamic change of shadow at 2.30 p.m. and 3.30 p.m. on winter solstice for buildings located in Bangkok, Thailand (13°N 100°30'E), east facing (AZ = 90°). Figure 3(a) and 3(b) show a BIPV (on the right), in which the shade comes from a nearby building (a surrounding obstacle). Point A and point B are

examples of three-dimensional coordinates that represent obstacle's location, while point C and point D are the shadow points on the rooftop PV surfaces that are determined from point A and point B in relation with the solar azimuth and altitude angles. While the locations of the surrounding obstacle (point A and point B) and the BIPV has been fixed, it can be clearly seen that an hour of time difference, between 2.30 p.m. and 3.30 p.m., the shadow points (point C and point D) have been moved with a distance and area and shape of the shaded PV surface has been changed greatly, as shown in Figure 3(c) and 3(d). This shift of projected shadow significantly changed the level of received solar irradiation of the associated PV surfaces (Ning et al., 2017).

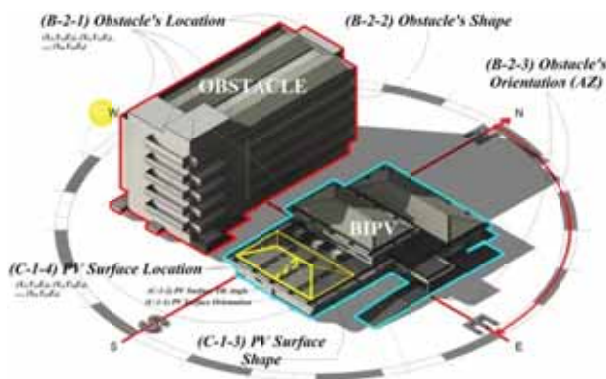


Figure 1. An illustration of the parameter of a surrounding obstacle (B-2) and the parameter of a PV surface geometry (C-1)

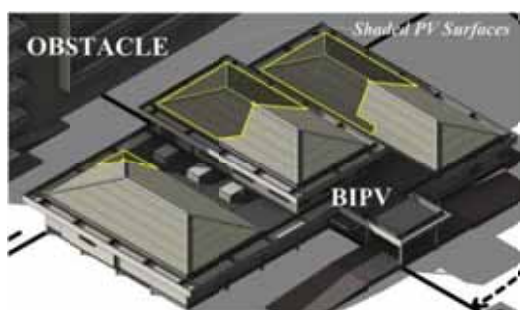


Figure 2. Example of complex shapes projection of shadow on the shaded PV surfaces

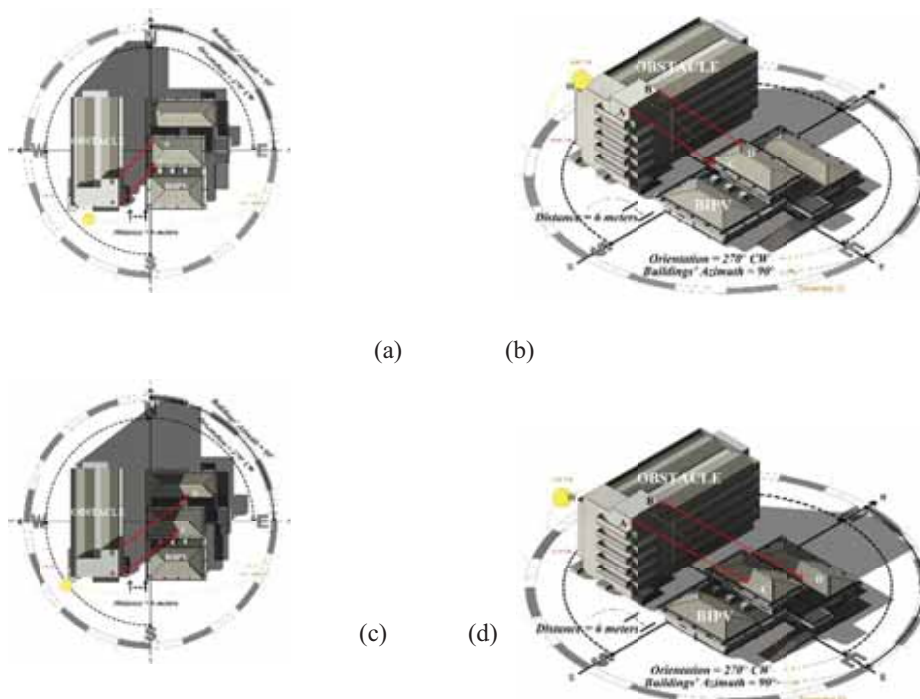


Figure 3. A dynamic change of projected shadow at 2.30 p.m. and 3.30 p.m. on winter solstice

Summarily, the impacts of the partial shading effects on the potential of power generation of a PV system can be calculated using the parameters of solar properties, surrounding and PV modules, which the result is the effective irradiance over a time period that called the solar insolation, as mentioned earlier in section 1.1, over PV surfaces. The conceptual relationships among them are displayed in Figure 4.

1.3 Statement of the Problem: The Surrounding Obstacle

Partial shading effect is an unavoidable condition in BIPV systems, and it can be seen from Figure 4 that such effect is principally influenced by two groups of parameters—1) PV surface geometries and 2) surrounding obstacle. Numerous studies have examined the parameter of PV surface geometries (Norton, et al., 2011; Yoo, 2011; Alam, Coors, Zlatanova, & Oosterom, 2012; Celik, Karatepe, Gokman, & Silvestre, 2013; Masa-bote & Caamaño-Martín, 2014; Kanters & Wall, 2014; Celik, Karatepe, Silvestre, Gokman, & Chouder, 2015; Eke & Demircan, 2015; Hong, Lee, Koo, Jeong, & Kim, 2017; Tripathy, Yadav, Sadhu, & Panda, 2017; Zomer & R  ther, 2017), while the investigation of the parameter of surrounding obstacles (Celik, Karatepe, Gokman, & Silvestre, 2013; Kanters & Wall, 2014; Kanters, 2015) is still meager. Consequently, this study focuses on the parameter of surrounding obstacle determining the projection of shadow on PV surfaces. No matter what kind of obstacles that surround the BIPV they are, trees, electricity poles, buildings and so on, when considering a nearby building obstacle, not only is it out of BIPV owner’s authority, but it is normally also not available for major alteration of its three-dimensional shape due to its variety of designated functions and aesthetic reason, not to mention the case that such building is not under the BIPV owner’s authority. Furthermore, apart from time and resource consuming, pursuing the optimum shape of a surrounding building tends to give impractical outcome.

Besides the obstacle’s shape, the shadow projected on BIPV obtained as shaded PV surfaces is determined in terms of the solar azimuth, altitude angles and surrounding obstacle’s location and orientation. Obstacle’s location is assumed to be composed of point particles (three-dimensional coordinates) interacting with a BIPV, i.e., through the proxy of distance between two buildings. Obstacle’s orientation refers to both the direction that BIPV faces towards and the location of building obstacle in relationship with the BIPV in terms of compass direction. The complexity of BIPV and surrounding placement manifestly brings difficulties for designers and planners to build an optimal solution when intending to achieve the best techno-economic targets (Kanters & Wall, 2014; Kanters, 2015; Ning, et al., 2017).

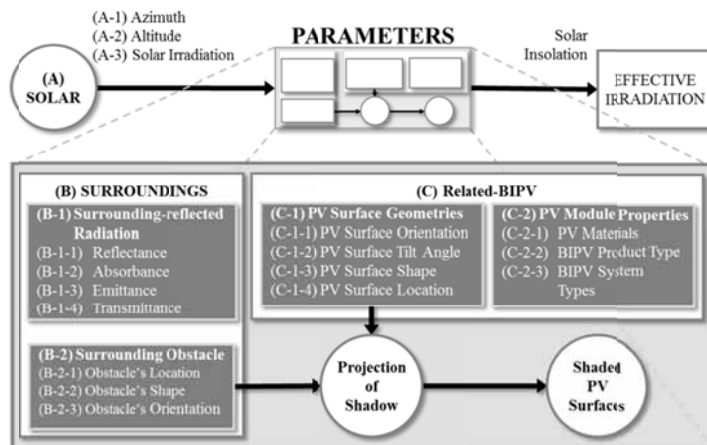


Figure 4. Relationship among parameters of partial shading effects influencing solar insolation of PV surfaces

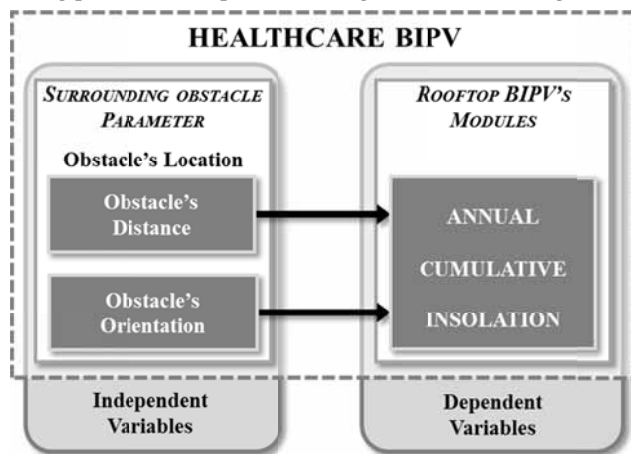


Figure 5. Conceptual framework of the study

Hence, this leads to the research question: of how the distance between building obstacle and BIPV, the orientation of

BIPV and the orientation between building obstacle and BIPV affect the potential to generate power of a BIPV. This study furtherly hypothesized that is orientation has more impact on the annual cumulative insolation on PV surfaces than distance. Thus, the conceptual framework of the study can be established and illustrated in Figure 5.

## 2. Methodology

### 2.1 Related Techniques in building performance simulation of BIPV

#### 2.1.1 BIPV and Building Performance Simulation (BPS)

Though BIPV technology has great potential for reducing carbon emissions from building energy consumption. However, there are currently some obstacles in the general adoption of this technology. One of the obstacles is evidence-based design that needed on the effectiveness of the maximum-efficient design of BIPV buildings as well as the benefits of BIPV to convince owners to opt for BIPV buildings (Kuo, Hsieh, Guo, & Chan, 2016). In order to quantify the benefit of BIPV design, it is required to estimate the potentials of the BIPV electricity production first by quantitative assessment of irradiance on the required surfaces to install PV modules by using Building Performance Simulation (BPS) tools. The main purpose of Building Performance Simulation (BPS) is to quantitatively justify design decisions as a result of predicting real physical conditions in a building by using a computational model, and to support building design processes by providing a high integrity representation of the dynamic, connected and non-linear physical processes that govern the disparate performance aspects that dictate overall acceptability of building and their related energy supply systems, particularly, the BPS involves a scientific basis in its simulation algorithms and the level of building information detail required as input data (Bazjanac, et al., 2011; Hitchcock & Wong, 2011; Clarke & Hensen, 2015; Shen & Lu, 2016). PV simulation tools are useful to perform detailed analysis of system performance and assess the viability of a PV system in terms of energy production (Eltawil & Zhao, 2010). For the purpose of optimal PV system design, many models and studies have been proposed in literature (Ning, et al., 2017) ranging from the solar radiation model (Liu & Jordan, 1960; Goswami, Kreith, & Kreider, 2000), PV panel conversion model for unshaded PV (Clark, Klein, & Beckman, 1984; Goss, Cole, Betts, & Gottschalg, 2014; Ramli, Twaha, Ishaque, & Al-Turki, 2017), the power mismatch models for the partially shaded PV systems (Alonso-Garcia, Ruiz, & Hermann, 2006; Karatepe, Boztepe, & Çolak, 2007; Dolar, Lazaroiu, Leva, & Manzolini, 2013; Bai, et al., 2015) and to evaluating and optimizing the efficiency of PV systems working in partial shading conditions (Woyte, Nijs, & Belmans, 2003; Celik, Karatepe, Gokman, & Silvestre, 2013; Celik, Karatepe, Silvestre, Gokman, & Chouder, 2015; Ning, et al., 2017). However, these research results have not been commonly used in practical design practices yet, and have mainly been limited in a few academic research studies. One of the major barriers, it is argued, lies in the complexities in accessing or reconstructing a large number of related information, especially building's information as it varies in locations, shapes and obstacles (Asl, Zarrinmehr, Bergin, & Yan, 2015; Ning, et al., 2017). The current practice involves collecting the mentioned information from a variety of sources and manually transforming this information into the specific input required by performance simulation (Gupta, Cemesova, Hopfe, Rezgui, & Sweet, 2014). While based on professional expertise, this manual process tends to be uniquely performed by each practitioner according to methods, arbitrary judgements, rules-of-thumb developed over time by that individual. The results is a non-standardized process that produces energy models that can widely vary from one modeler to the next, even given the same initial building design information and these BPS models have been achieved with much duplication of efforts, time-consuming, and significant deficiencies remain. This is applicable not only to various BPS tools but also to various renewable energy simulation tools including solar PV simulation models as well (Bazjanac, et al., 2011; Hitchcock & Wong, 2011; Clarke & Hensen, 2015; Ning, et al., 2017).

#### 2.1.2 Automated BPS and Building Information Modeling (BIM)

An intelligent approach to better deal with these deficiencies in BPS, from the time-consuming, cumbersome and error-prone of manual data generation and use of improvised defined data that may invalidate the results, is the automation of BPS input data acquisition and transformation, it has been a goal of the buildings industry for decades (Bazjanac, et al., 2011; Hitchcock & Wong, 2011; Clarke & Hensen, 2015) Reusing of existing data by interoperable processes would significantly reduce the time and overhead associated with the creation of simulation models (Hand, Crawley, Donn, & Lawrie, 2005; Bazjanac, et al., 2011; O'Donnell, et al., 2011). An interoperable, intelligent and object-oriented simulation model would enable bi-directional data exchange with a Building Information Modelling (BIM) authoring applications, reusing of geometric and other data from different models significantly reduces the overhead associated with the definition of input data and has the potential to eliminate error-prone manual processes (O'Donnell, et al., 2011; Ning, et al., 2017).

Nowadays, it is generally accepted by the Architecture, Engineering, Construction, and Operations (AECO) industries that Building Information Modeling (BIM) is the most promising technology for enhancing the performance and quality of construction (Kuo, Hsieh, Guo, & Chan, 2016; Somboonwit, Boontore, & Rugwongwan, 2017). A BIM is a tool / methodology / paradigm / process of virtual design and construction involving the generation and management of digital representations of physical and functional characteristics of a facility which creates and uses the coordinated, consistent, computable information of the 3D models of the project components interconnect with the holistic information that conceived as a source of shared knowledge to support decision-making, through the life cycle of the building. When completed, these computer-generated-semantic-3D models contain precise geometry and data needed

to support the construction, fabrication, and procurement activities through which the building is realized (Krygiel & Nies, 2008; Kymmell, 2008; Eastman, Teicholz, Sacks, & Liston, 2011; Matthew, Jason, Melissa, Seokho, & Fiona, 2013; Ladenhauf, et al., 2015; Agugiaro, 2016; Kuo, Hsieh, Guo, & Chan, 2016; Somboonwit, Boontore, & Rugwongwan, 2017). There is a very useful feature of BIM is that building geometry can be extracted from a BIM model to support the assessment of alternative sustainable design principles.

BIPV design processes involve elements of expertise deriving from multiple disciplines such as architects, civil, mechanical and electrical engineers (Negendahl, 2015). With numerous unified tools that act both as a design tool and BPS tool exist, building designers still seem to prefer to create and explore design options in dedicated design tool such as AutoCAD, ArchiCAD, Revit, SketchUp, etc., as they support the concept of a sketch and the freedoms associated with design tools. The integration of a design tool and a BPS tools is fundamentally changing building design into a faster, performance-aware and more flexible process, which eases the production of multiple design alternatives that provide model foundations for BIPV design optimization (Negendahl, 2015; Ning, et al., 2017). Furthermore, many buildings have already been modelled with BIM authoring tools, in which the features of most building components, e.g. shape, size, materials, locations as well as building's environment, has been accurately described (Ning, et al., 2017).

Regarding reviews of BIM-based simulation and optimization for BIPV, there are several types of study related to this research scope including researches focus on BIPV simulation (Long, Wang, Zhou, & Zhang, 2014; Chen & Ger, 2014; Dixit & Yan, 2015), BIPV optimization (Welle, Haymaker, & Rogers, 2011; Ning, et al., 2017) and BIPV integrated parametric design (Kensek, 2014; Kim, Asl, & Yan, 2015, Hofer, Groenewolt, Jayathissa, Nagy, & Schlueter, 2016; Nagy, et al., 2016; Somboonwit, Boontore, & Rugwongwan, 2017). Unfortunately, only a small fraction of BPS tools can be used in automated processes required to perform BIPV performance simulation and optimization, and it is unable to be successfully achieved because commercially available tools offer simulation of particular performances to some extent, and yet there is still no 3D CAD/BIM commercial tool that targets all types of BIPV (not only roof mounted), nor complex BIPV or provides seamless model exchange and full geometrical representation for integration in architectural design (Attia, De Herde, Gratia, & Hensen, 2013; Negendahl, 2015; Jakica, 2017; Somboonwit, Boontore, & Rugwongwan, 2017).

### 2.1.3 Simulation of Partial Shading Effects

It is important to include an accurate methodology for evaluating the fluctuation of potential PV power generation caused by partial shadow effects. Therefore the quantitative assessment of the incident irradiance on their surface is the most important issue, which affects the performance of the PV systems directly (Yoon, Song, & Lee, 2011; Celik, Karatepe, Gokman, & Silvestre, 2013; Yang, 2015). There are several studies that provide theoretical models to simulate the behavior of PV modules and generators in conditions of non-uniform radiation and also studies that provide models to estimate the effective irradiation, thus, after incorporating shading effects and these models are able to be used to estimate the electricity losses and mismatch losses in which the PV system incurs due to the effect of inhomogeneous irradiation (Norton, et al., 2011; Alam, Coors, Zlatanova, & Oosterom, 2012; Celik, Karatepe, Gokman, & Silvestre, 2013; Masa-bote & Caamaño-Martín, 2014; Celik, Karatepe, Silvestre, Gokman, & Chouder, 2015; Hong, Lee, Koo, Jeong, & Kim, 2017; Zomer & Rüter, 2017). However, there are a very few studies of the optimization of facility planning and buildings placement that strengthen solar energy utilization of a building in an interconnected composition with surrounding buildings to reduce the impacts of shading conditions due to dynamic changing of solar geometry. Kanters and Wall (2014) explored the effect of four factors on the solar potential of building blocks typically used in urban planning, i.e. form, density, orientation and roof type. The results showed that density (the closer the distance between buildings is, the higher the urban density becomes) was the most influential factor, while the effect of orientation was not that clear (Kanters & Wall, 2014). Bhattacharjee, Noble, Kensek and Schiler (2016) studied solar envelope for sites with existing buildings using a computational design tool for generating solar envelopes that allowed additional volume to be added to existing building geometry without further casting shadows on neighboring sites. While the usable floor area has been increased but the shape of the buildings has been transformed into something that irregular and eccentric, furthermore, if the physical boundaries of the site and the surroundings the determine the solar envelope of the buildings have been changed, it possibly that the added volume might not be positively contented complying with the change of solar envelope. Thus, it possibly implies that focusing on the shape of surrounding obstacles to enhance solar energy utilization might be an endless task (Bhattacharjee, Noble, Kensek, & Schiler, 2016). In high-density urban areas or campuses, the solar access of a building has been affected directly, especially the clustered facility developments that put pressures on land usage and create large buildings occupying maximum plot ratio that create solar obstructions on rooftop PV systems that installed on lower-rise buildings, as shown in Figure 6.

Without proper siting and buildings placement, a structure cannot be designed for maximum power generation from a solar PV system. Referring to a previously mentioned argument, there are just a few studies of the investigation of the parameter of surrounding obstacles but there is no previous study that explores the most critical parameters of surrounding obstacle determining the projection of shadow on PV surfaces that influence over the potential to power generation of a PV system through automated processes of BPS and BIM. The findings of the study are important for decision supporting in BIPV design and facility planning and providing guidelines of automated BPS processes that

seamlessly interoperating with BIM.

## 2.2 Case Study

This study presents an analytical method to explore the most critical parameters of the partial shading effects on PV surfaces caused by surrounding obstacles—obstacle's distance and obstacle's orientation, that affect the annual cumulative insolation on photovoltaic modules that are attached to roof surfaces through an automatic collaboration of a BIM authoring software, Autodesk Revit, and a cloud-based building performance analysis tool that embedded within a BIM authoring software, Autodesk Insight 360.

### 2.2.1 Generalizable Building Designs (GBDs)

Thailand has a multilevel healthcare system aiming to improve geographical access of the population, in addition to enhancing system efficiency through rational use of service by level and proper referral systems (Jongudomsuk, et al., 2015). Public healthcare facilities in Thailand have provided medical services with interrelationships between buildings that contain sections / departments / units and environment. Most of their design and construction have been under supervision of the Design and Construction Division (DCD), a subdivision of the Ministry of Public Health (MOPH), Thailand. There is more than fifty years that the DCD has produced and provided more than 10,000 designs of healthcare facilities. In general, the process of public healthcare facilities planning is developed by a multidisciplinary team including architects, engineers, and interior designers who work for the DCD and medical specialists. Most of the public healthcare facilities have been administered by the using of DCD's Generalizable Building Designs (GBDs), i.e. cookie-cutter healthcare building designs, from the concept of "one size fits all" for universal application on healthcare facilities design which is in the GBD criteria of its type, functions, size and work load capacity.



Figure 6. An illustration of a shadow range from 8.00 am to 5.00 pm on winter solstice, demonstrates a common problem that PV system designers may encounter to optimize the rooftop PV system deployment.

The GBDs have been developed with the aims to minimize time and resources consumed during new building design processes and to be flexible to accommodate the healthcare construction projects all over Thailand, especially in the rural and remote areas. It is inevitable that the GBDs should be simple and easy to be built by any local contractors which most of them are using low construction technology and capable to acquire just inexpensive and locally available materials. However the GBDs have been utilized without or lack of decisive thoughtfulness on local factors, i.e., location, orientation, weather condition and particularly, inept configuration of the site planning to minimize energy consumption and enhancing renewable energy generation (Somboonwit, 2011; Somboonwit & Sahachaisaeree, 2012).

Public healthcare facilities in Thailand usually located and built in government-own or donated lands, thus these parcels of land are all different sizes and shapes, furthermore, their orientations and surrounding contexts are uncontrollable. The MOPH is obliged to build public healthcare facilities on these sites whenever their sizes could fit all the buildings and facilities that needed.

Two case study buildings have been selected: (1) an outpatient department (OPD) building, DCD number 3130/2536, was chosen as a case study to be the BIPV which PV modules have been installed on the OPD's sloped roofs, and (2) a ward building, DCD number 8605 was chosen as a case study to be the obstacle. These two buildings are the widely established in the community/general hospitals that provide secondary level of Thailand's healthcare services that serves more than 20 million of Thai people (Somboonwit & Sahachaisaeree, 2012). The OPD building usually located on a hospital's site as the main building and a critical gateway for the healthcare facilities. The OPD building has been selected to be the BIPV because it is the principal GBD for this level of healthcare service and it has the highest ratio of roof-to-functional-area among all the GBDs and its roofs are able to contribute a large amount of solar irradiation since that the contribution of façades is rather limited and they receive less irradiation than the roof, also have a limited contribution in solar energy production (Kanters, 2015). The minimum distance that is a separation between buildings in healthcare facilities must be at least 6 meters, from the outermost edge of a building to the outermost edge of another building, with vertical clearance which is unobstructed vertical passage space that required along the buildings

for fire safety and circulation routes.

### 2.2.2 Physical Settings of the Case Study

The physical settings of the two case study buildings are those of typical cost-control public health facilities: the structural construction is in situ reinforced concrete, the exterior opaque walls are plastered brick walls, the glazing for windows is 6-millimeter clear float glass, and the roofs are fiber-cement roof tiles.

The case study building #1, an OPD building number 3130/2536 as shown in Figure 7(a), this two-story building has an irregular-shaped footprint with gross floor area of 1,125 m<sup>2</sup> which contains functional areas to be fully operational Out-patient Department: examination rooms, an emergency department, a laboratory, an x-ray room, a dental department, a pharmacy department, operation rooms, and an administration department. It is a mixed-mode building that combines natural and mechanical systems for ventilation and cooling. The sloped roofs of the OPD building are three rectangle-based hipped roofs with 20° roofs' pitches. The total area of the sloped roof surfaces is 712 m<sup>2</sup>, these surfaces of these roofing systems have been used to mount PV modules and the total cumulative solar insolation on these surfaces of the solar PV modules has been taken into account for estimating solar potential and output energy of the PV systems. The height from the ground level to the highest point of roofs is approximately 10 meter.

The case study building #2 is a ward building, DCD number 8605 as shown in Figure 7(b). This five-story rectangle shaped building is 21.00 meters wide, 46.50 meters long and 24.00 meters high. This ward building has usually been placed nearby the OPD building, the minimum distance equals to 6 meters without the maximum distance, depends on the site but does usually not exceed 36 meters.

### 2.3 Steps of Automated BPS

In this study, the axis of the OPD building has been aligned with the axis of the ward building, center to center of the two buildings. These aligned axes which are the representation of the interaction between geometries of the two buildings is kept stationary to maintain the consistency of the simulations while comparing the annual cumulative insolation of the 8-different orientations of the axis-aligned buildings and the 43-different distances between the two buildings.

#### 2.3.1 BIM Models Developing and the LOD

The proposed methodology has three main steps. The first step, BIM models of the two case study buildings have been developed. BIM model of the case study building #1, OPD building, has been developed at LOD 300.

LOD (Level of Development) is concept to describe information richness of BIM objects, ranges from LOD 100 (basic/conceptual) to 500 (highly detailed/precise). LOD 300 is the Model Elements is graphically represented within the model as a specific system, and non-graphic information may also be attached to the Model Element (BIMForum, 2013; Volk, Stengel, & Schultmann, 2014; Autodesk Sustainability Workshop, 2017).



Figure 7. Photographs of (a) the OPD building and (b) the wards building



Figure 8. The LOD-300 BIM model of the OPD building—the BIPV



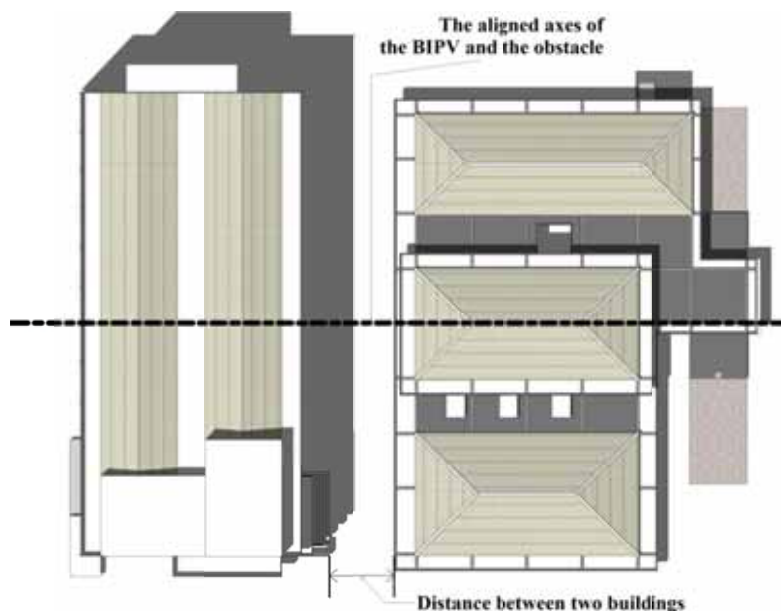


Figure 9. Illustration of the aligned axes of the BIPV and the obstacle and distance between the buildings

The OPD has been chosen to be a BIPV, thus a development of its BIM model requires details and functionalities with a certain accuracy, information richness and actuality of the underlying data to support further design and modeling processes of PV systems (Figure 8). Otherwise, the development of the ward building's BIM model is at LOD 200, it is graphically represented within the model as a generic system, non-graphic information may also be attached to the Model Element (BIMForum, 2013). This case study #2 has been utilized to be a building-surrounded obstacle, thus, its important BIM parameters are the obstacle's location and geometry that have been derived into three-dimensional coordinates that used to determine the projection of shadow on PV modules by the dynamic change of solar azimuth and altitude angles.

That is very important to limit the LOD of the model to the minimum, due to more-detailed modeling needs more time and effort that ranging from doubling the effort to eleven folding them, and more computational power of the building performance simulation to acquire the results is also needed (Leite, Akcamete, Akinci, Atasoy, & Kiziltas, 2011).

### 2.3.2 Location Settings

The second step is setting a BIM project to create a digital environment for solar insolation simulation. Import the two BIM models into a BIM project and align the center axes of the models as shown in Figure 9. Set the orientation of the axis-aligned models to face south: true north-based azimuth (AZ) of  $180^\circ$ , the baseline models which have  $0^\circ$  CW (Clockwise) rotation angle. The nearest distance between the two models has been set to 6 meters. The location to simulate the annual cumulative insolation is Bangkok, Thailand. Its global coordinates are  $13^\circ\text{N } 100^\circ30'\text{E}$  and this location lies two meters above sea level. The monthly mean assess global solar radiation (GSR) of Bangkok has been estimated in the range of  $5.64$  to  $22.53$   $\text{MJ}/\text{m}^2/\text{day}$  (Waewsak, Chancham, Mani, & Gagnon, 2014), it is equal to  $1.57$  to  $6.26$   $\text{kWh}/\text{m}^2/\text{day}$  or  $573.05$  to  $2,284.9$   $\text{kWh}/\text{m}^2/\text{year}$ .

### 2.3.3 Obstacle's Distance and Obstacle's Orientation

The third step is to simulate the annual cumulative insolation on the PV surfaces of the BIM model of the OPD building using Autodesk Insight 360, a fully automatic cloud-based building performance analysis tool. To discover the influence of obstacle's distance, the baseline models— $0^\circ$  CW, has been performed annual cumulative insolation simulation at every 1-meter interval of the distance from 6 meters to 48 meters between the axis-aligned case study buildings. There are 43 simulations have been performed at  $0^\circ$  CW models. To discover the comparative influence of obstacle's distance and obstacle's orientation, annual cumulative insolation simulations of  $0^\circ$  CW have been performed against other seven orientations clockwise (CW), i.e.  $45^\circ$  (AZ =  $225^\circ$ ),  $90^\circ$  (AZ =  $270^\circ$ ),  $135^\circ$  (AZ =  $315^\circ$ ),  $180^\circ$  (AZ =  $0^\circ$ ),  $225^\circ$  (AZ =  $45^\circ$ ),  $270^\circ$  (AZ =  $90^\circ$ ) and  $315^\circ$  (AZ =  $135^\circ$ ), as shown in Figure 10. Annual cumulative insolation of all seven other orientations have been simulated at every 1 meter intervals of the distance from 6 meters to 48 meters between the axis-aligned buildings as well. There are total 344 annual cumulative insolation simulations have been performed in this study.

The mentioned methods of modeling and simulation can be extended for annual PV energy production simulations according to the capabilities of the analysis tool (Egger, 2015; Stine, 2015).

## 3. Results and Discussion

Once a simulation has been performed, the results have been displayed automatically within the BIM authoring platform. Individually, each of the simulations provides results of solar analysis including; total cumulative insolation

(kWh), cumulative insolation per square meter (kWh/m<sup>2</sup>), total simulated area (m<sup>2</sup>) and the interval of total time period of the analysis, month-day to month-day, and the intervals of time periods during the daily analysis, sunrise to sunset, as shown in Figure 11(a). The analysis tool also provides graphical results within the BIM models as shown in Figure 11(b). Insolation refers to the quantity of solar radiation energy received on a surface of size one m<sup>2</sup> during an amount of time. It is commonly expressed as average irradiance in watts per square meter (W/m<sup>2</sup>) or kilowatt-hours per square meter per day (kW•h/(m<sup>2</sup>•day)) (or hours/day) (Solarinsolation.org, 2012; Sinovoltaics, 2014).

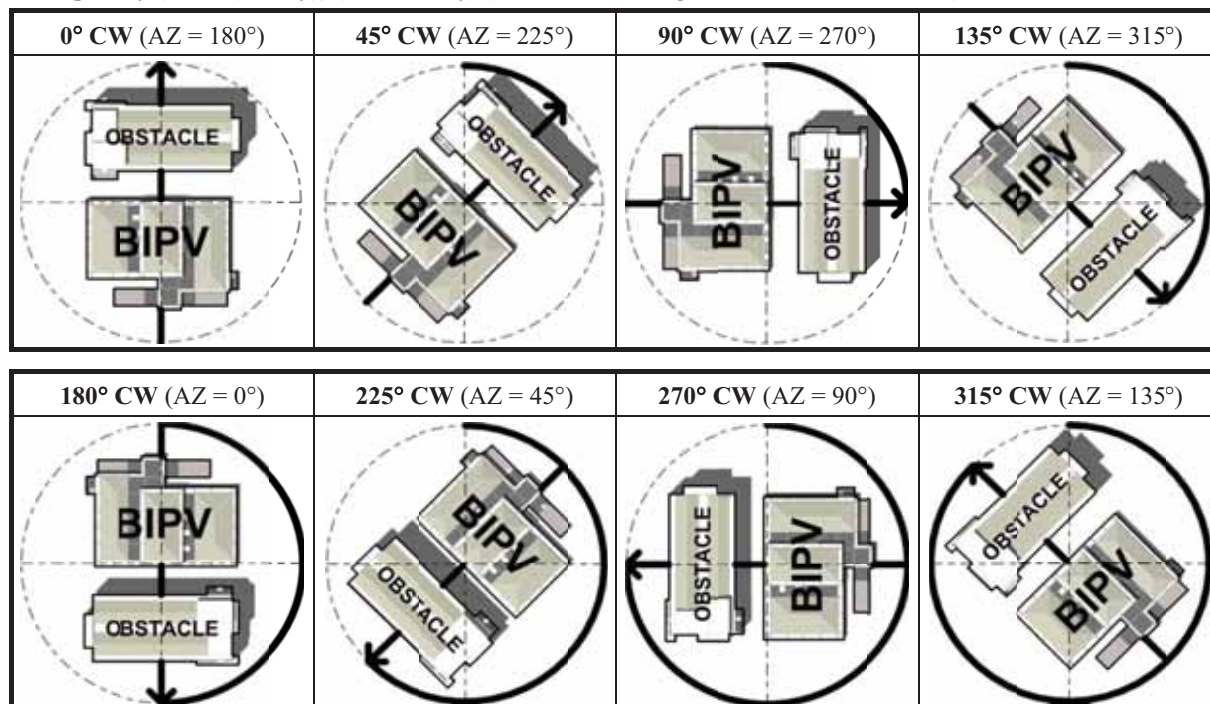


Figure 10. Orientations of the case study—the axis-aligned buildings



Figure 11. (a) Solar Analysis results of the 0°CW at 6-meter distance (b) gradient colors of the ranges between the minimum cumulative insolation (purple) and the maximum (bright green) on the analyzed surfaces

### 3.1 Comparisons of the Annual Cumulative Insolation of All Simulations

As outlined, the case study carried out with 344 combinations of 8 orientations and 43 intervals of 1-meter distance; from 6 to 48 meters, have been simulated to explore the comparative effects between obstacle’s distance and obstacle’s orientation parameters that cause partially shading effects and influence the potential solar power generation of a photovoltaic (PV) system. The annual cumulative insolation on the PV surfaces of all simulations has been presented in Figure 12. The simulation results of every orientations have shared just one thing in common, their curves are logarithmic shape that have periods of rapid increase at first, followed by periods where the gains increasing slowly then reach the plateaus at their farthest distances. It can be seen that it is a distinctive difference to separate the 8 curves into three groups: the first group (A<sub>1</sub>) is only 0°CW orientation, the curve that starts at the highest annual cumulative insolation and increases at very slow rate while distance is increasing; the second group (A<sub>2</sub>) consists of curves that start at slightly lower annual cumulative insolation than A<sub>1</sub> but increase at faster rate while distance is increasing than A<sub>1</sub>, the curves in the A<sub>2</sub> are 45°CW, 180°CW and 315°CW orientation (Figure 13); and the third group

(B) that start at lower annual cumulative insolation than both  $A_1$  and  $A_2$  but increase at much faster rate, it consists of  $90^\circ\text{CW}$ ,  $135^\circ\text{CW}$ ,  $225^\circ\text{CW}$  and  $270^\circ\text{CW}$  orientation, as shown in Figure 14.

Figure 13 shows the only curve of the first group ( $A_1$ ) that has the maximum annual cumulative insolation on the PV surfaces at the nearest distance, 6 meters, is  $0^\circ\text{CW}$  orientation (893,937 kWh) and it keeps being the maximum until it passes 15 meters. Each of a more 1-meter interval, the  $0^\circ\text{CW}$  gains more annual cumulative insolation very slowly. The shape of the curve of the  $0^\circ\text{CW}$  is almost linear and it has been least influenced by distance of all. While curves in the second group ( $A_2$ ) show that  $45^\circ\text{CW}$ ,  $180^\circ\text{CW}$  and  $315^\circ\text{CW}$  orientation that have the annual cumulative insolation on the PV surfaces lower than the  $A_1$  at 6-meters distance but they have raised fast in annual cumulative insolation until all curves of  $A_2$  surpass  $A_1$  at 16 meters. Figure 14 shows a rally of the fast-rising curves in the third group (B);  $90^\circ\text{CW}$ ,  $135^\circ\text{CW}$ ,  $225^\circ\text{CW}$ . The biggest gain is  $270^\circ\text{CW}$  orientation that has truly come from behind, from the lowest annual cumulative insolation at 6-meter distance becomes the highest at 45 meters to 48 meters—the farthest distance of the study.

At the distance of 6 meters, the compared potential solar power between  $0^\circ\text{CW}$  ( $A_1$ ) and  $270^\circ\text{CW}$  (B) is different dramatically, it is 43,411 kWh or 5.1040% that  $0^\circ\text{CW}$  higher than  $270^\circ\text{CW}$ . Contrastively, at the distance of 48 meters,  $0^\circ\text{CW}$  obtains the annual cumulative insolation less than  $270^\circ\text{CW}$  does for 0.6277%, additionally, at this distance of  $0^\circ\text{CW}$ , it gains more annual cumulative insolation than it does at the 6-meter distance just 0.93%. In spite of the fact that at 48 meters of  $270^\circ\text{CW}$  obtains annual cumulative insolation more than its 6-meter distance does tremendously, 6.7501%, but there would be very few hospitals and not practical that an OPD building has been located that far from a wards building just for serving the purpose of solar energy generation.

### 3.2 The comparison of influence between obstacle’s distance and obstacle’s orientation

As previously mentioned that the sizes, shapes, orientations and surrounding contexts of the sites to establish public healthcare facilities in Thailand are uncontrollable, furthermore, the obligation to use DCD’s Generalizable Building Designs (GBDs) to be constructed in these healthcare facilities have exacerbated the problems of nonoptimal PV system installations caused by partial shading effects. The PV modules attached sloped roofs have also been a problem, especial PV hipped roofs, they are unable to generate the highest energy production because of their surfaces would never have the optimal inclination and orientation to receive the highest solar radiation constantly and simultaneously. These limitations must be brought to be carefully considered during the PV system design processes.

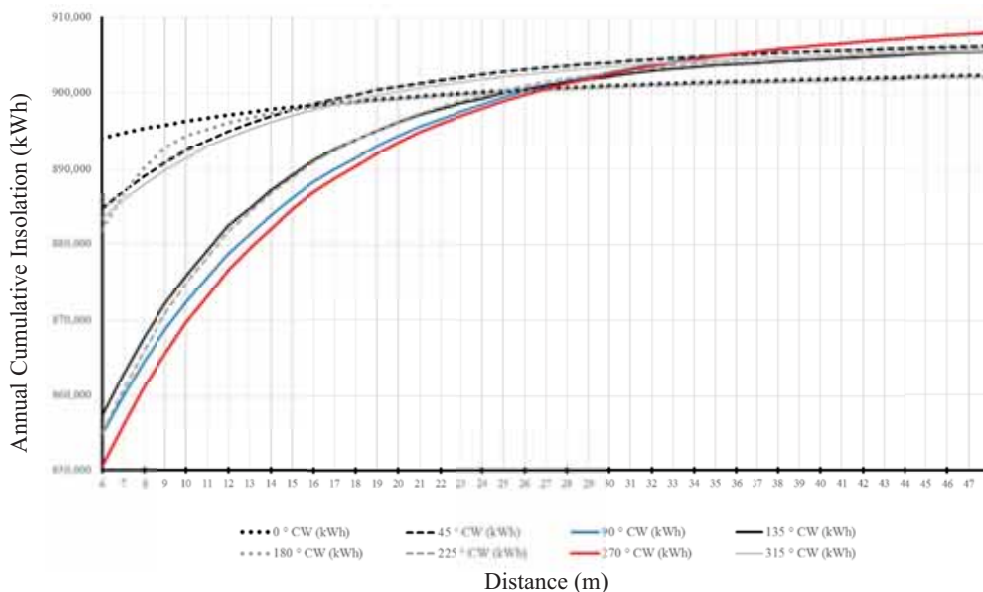


Figure 12. Annual cumulative insolation of all orientations and distance; 8 orientations, 43 distances from 6 meters to 48 meters

Results from this study show that obstacle’s orientation and obstacle’s distance of a building-surrounded obstacle are both important parameters that influencing the annual cumulative insolation of PV surfaces but in the different contexts. It was also shown that at such orientations of the first group ( $A_1$ ):  $0^\circ\text{CW}$  and the second group ( $A_2$ ):  $45^\circ\text{CW}$ ,  $180^\circ\text{CW}$  and  $315^\circ\text{CW}$  orientation, the potential PV power generation of the BIPV is high since the nearest distance and almost consistent until the farthest distance between the BIPV and the obstacle. These ( $A_1$  and  $A_2$ ) are the recommended orientations for BIPV application on lower-rise buildings in urban environments, such as healthcare facilities, as they steadily receive solar irradiation with less sensitive to a crucial parameter of surrounding obstacles—the obstacle’s distance, that means the lower-rise BIPVs with these orientations are capable of generating solar energy to reach their nearly full potential, whether how far they are from a much-taller surrounding obstacle. On

the other hand, there is obviously seen that the distance between BIPV and surrounding obstacle is also a very powerful parameter that influences the potential PV power generation, thus on the condition of the placement that define orientation of the BIPV and a surrounding obstacle is not optimal, such as 90°CW, 135°CW, 225°CW and 270°CW orientation, placing the two buildings farther from each other will enhance the energy producing from the PV system.

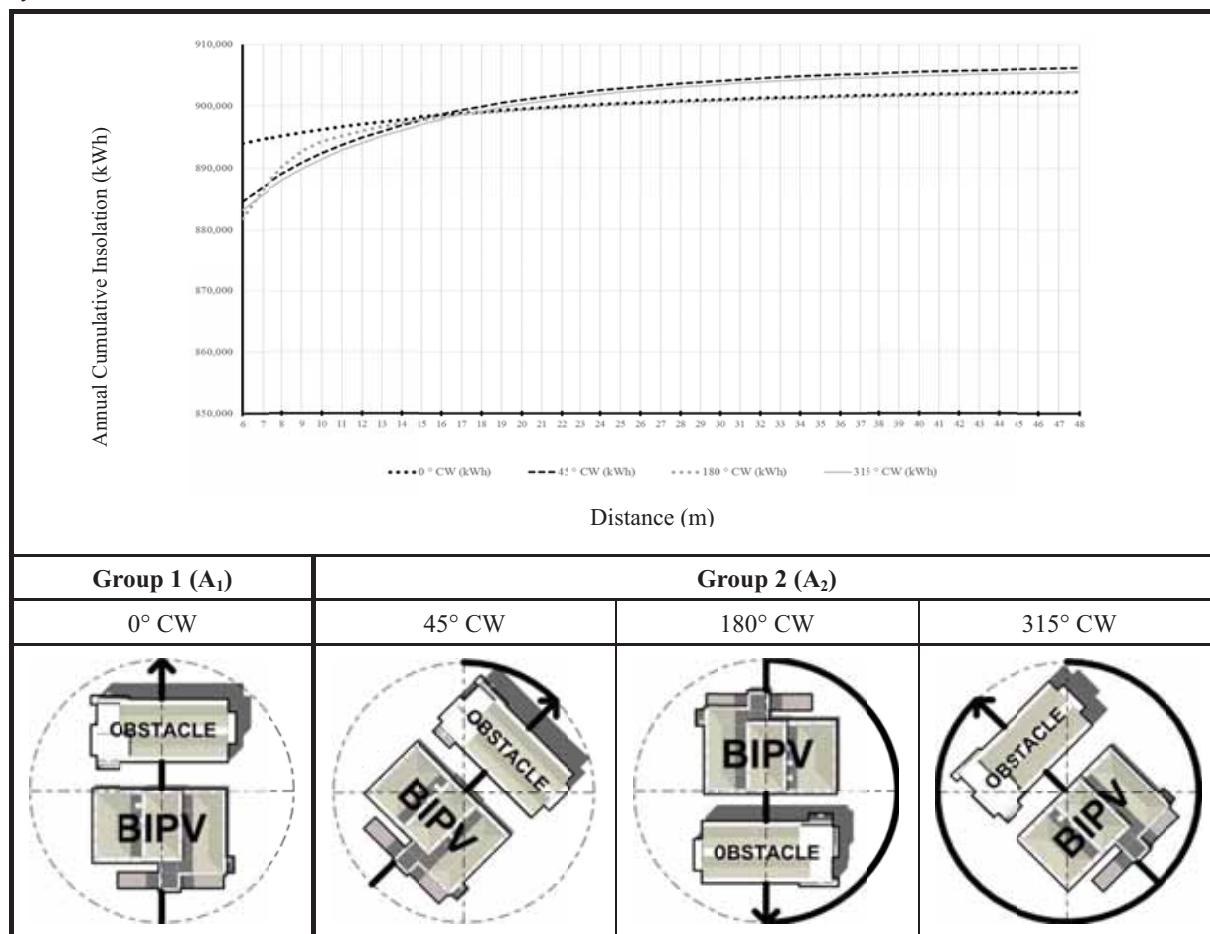


Figure 13. Annual cumulative insolation of Group 1 (A<sub>1</sub>) and Group 2 (A<sub>2</sub>)

#### 4. Conclusion and Future Work

This study presents an analytical method to explore the comparative effects between the most critical parameters of a surrounding obstacle that cause partial shading effects; obstacle’s distance and obstacle’s orientation that influence the potential solar power generation of a rooftop PV system.

The proposed methodology is based on the simulated annual cumulative insolation obtained from rooftop PV surfaces of eight different orientations and forty-three different distances between the BIPV and building obstacle through an automatic collaboration of a BIM authoring software, Autodesk Revit and a cloud-based building performance analysis tool, Autodesk Insight 360. In this study, two GBDs has been selected to be the case studies; an OPD building for the BIPV and a wards building for the obstacle. BIM models of the two case study buildings have been built at different LODs (Level of Development) to provide a suitable level of details and functionalities with a certain accuracy, information richness and actuality of the underlying data while maintaining the simplicity of computational processes. The BIM-based automated simulations have been substantiated the usability of one of the most promising technology in AECO industry that removed the deficiencies; time-consuming, cumbersome and error-prone of the non-automated processes. This study explores that orientation and distance of a surrounding obstacle are both crucial parameters that dramatically affect the annual cumulative insolation of PV surfaces. The findings of this study also support decision making for BIPV designers and facility planners to acknowledge which the BIPV and the obstacle placement is highly effective and a worthwhile investment to install a PV system, and which one is encountering a problem and how to solve it. Solar power is expensive and inefficient, thus a well-integrated solar system might require extra efforts and considerations of design work, especially the architectural integration of PV elements into the urban environments to capture the maximum amount of solar radiation. For future work, parametric design and modeling tools that enable parameters to be processed by mathematical formulas and computational algorithms can be integrated with the BIPV design to suggest a systematic design decision process that might help maximizing the efficiency and productivity of PV implementations in dense urban environments.

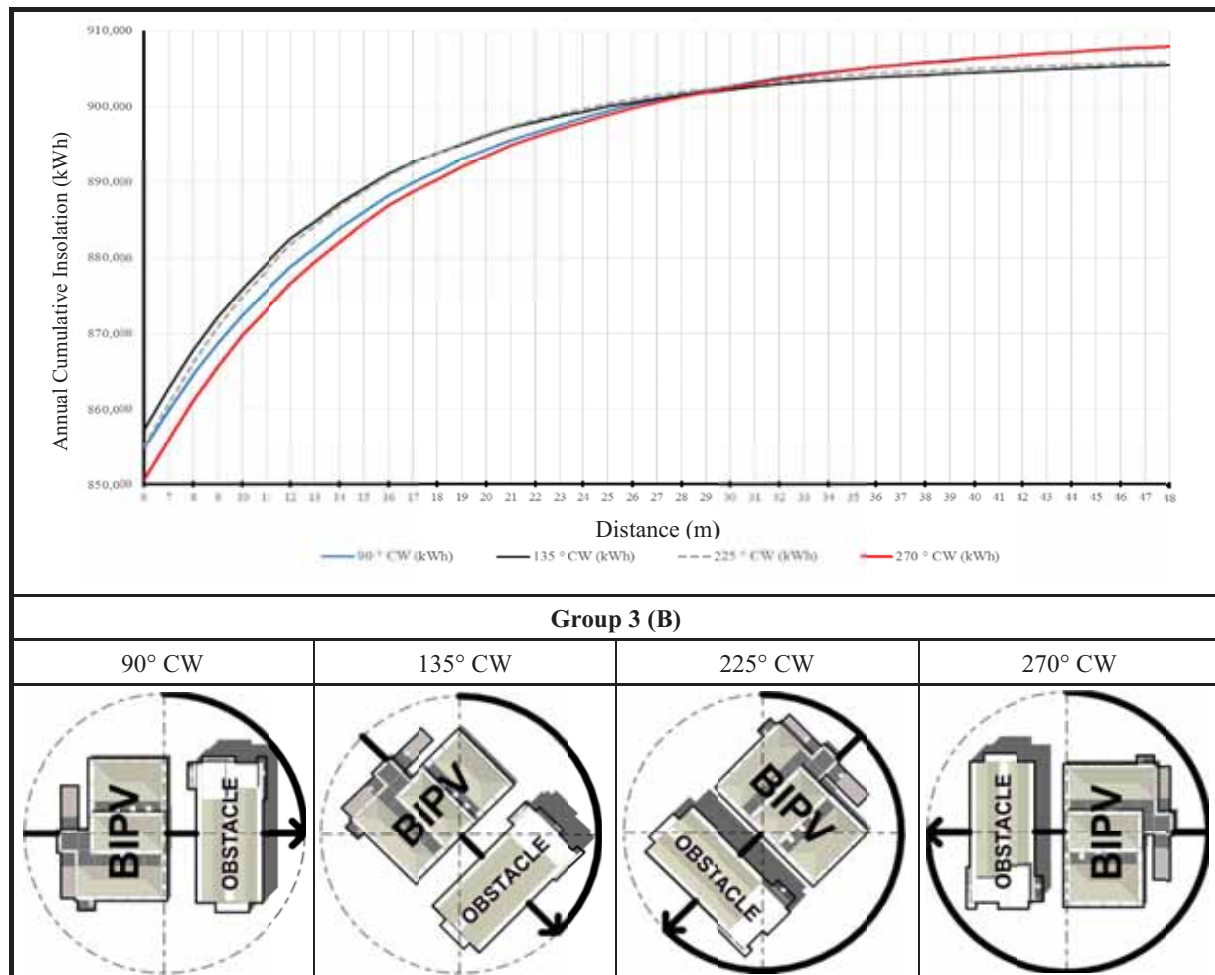


Figure 14. Annual cumulative insolation of Group 3 (B)

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## Appendix A

### The Simulated Annual Cumulative Insolation Results of All 8 Orientations

Distance (m)	0 ° CW (kWh)	45 ° CW (kWh)	90 ° CW (kWh)	135 ° CW (kWh)	180 ° CW (kWh)	225 ° CW (kWh)	270 ° CW (kWh)	315 ° CW (kWh)
6	893,937	884,637	854,723	857,213	881,863	854,965	850,526	883,266
7	894,615	886,955	859,743	862,680	886,524	860,655	855,919	885,765
8	895,249	889,031	864,541	867,832	890,128	866,069	861,096	887,957
9	895,782	890,834	868,668	872,153	892,730	870,874	865,575	889,799
10	896,293	892,438	872,458	875,896	894,354	874,920	869,729	891,398
11	896,726	893,719	875,602	879,221	895,229	878,368	873,197	892,957
12	897,150	894,986	878,827	882,524	896,073	881,803	876,610	894,065
13	897,509	895,980	881,362	884,757	896,741	884,212	879,454	895,199
14	897,860	896,988	883,841	887,178	897,345	886,800	882,097	896,150
15	898,185	897,817	886,107	889,173	897,781	888,810	884,613	897,087
16	898,478	898,605	888,254	891,126	898,168	890,866	886,912	897,856
17	898,742	899,243	889,972	892,624	898,547	892,476	888,751	898,547
18	898,978	899,828	891,469	893,852	898,802	893,835	890,327	899,128
19	899,229	900,457	893,036	895,039	899,060	895,145	892,053	899,738
20	899,437	900,896	894,331	896,202	899,270	896,366	893,476	900,244
21	899,646	901,327	895,579	897,192	899,482	897,403	894,909	900,699
22	899,826	901,728	896,604	897,995	899,662	898,258	895,978	901,145
23	900,002	902,087	897,590	898,719	899,838	899,024	897,033	901,505
24	900,168	902,497	898,514	899,310	900,004	899,686	897,979	901,858
25	900,340	902,817	899,455	900,040	900,176	900,427	898,947	902,183
26	900,486	903,096	900,239	900,554	900,322	900,982	899,825	902,460
27	900,627	903,360	900,934	901,085	900,463	901,549	900,587	902,745
28	900,763	903,617	901,640	901,490	900,599	901,949	901,335	903,007
29	900,880	903,847	902,140	901,864	900,716	902,317	901,873	903,249
30	900,990	904,042	902,712	902,215	900,826	902,653	902,461	903,476
31	901,101	904,280	903,227	902,601	900,937	903,028	903,029	903,699
32	901,214	904,454	903,771	902,928	901,050	903,347	903,602	903,888
33	901,312	904,635	904,199	903,215	901,148	903,639	904,049	904,051

Distance (m)	0 ° CW (kWh)	45 ° CW (kWh)	90 ° CW (kWh)	135 ° CW (kWh)	180 ° CW (kWh)	225 ° CW (kWh)	270 ° CW (kWh)	315 ° CW (kWh)
34	901,397	904,773	904,569	903,440	901,233	903,868	904,450	904,193
35	901,479	904,917	904,919	903,671	901,315	904,138	904,830	904,327
36	901,564	905,064	905,260	903,855	901,401	904,356	905,188	904,460
37	901,630	905,156	905,511	904,013	901,467	904,513	905,453	904,558
38	901,714	905,313	905,841	904,162	901,550	904,674	905,769	904,679
39	901,772	905,397	906,050	904,316	901,608	904,806	905,997	904,774
40	901,847	905,534	906,347	904,490	901,681	904,980	906,291	904,895
41	901,897	905,607	906,527	904,617	901,733	905,080	906,501	904,982
42	901,965	905,706	906,796	904,774	901,801	905,237	906,774	905,073
43	902,020	905,804	907,000	904,885	901,857	905,343	906,976	905,165
44	902,071	905,873	907,188	905,039	901,908	905,453	907,173	905,238
45	902,125	905,956	907,372	905,170	901,961	905,568	907,392	905,337
46	902,176	906,022	907,562	905,287	902,012	905,679	907,603	905,408
47	902,222	906,090	907,708	905,370	902,058	905,778	907,756	905,408
48	902,273	906,161	907,856	905,454	902,109	905,860	907,937	905,551

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# The Political Trends of the Youth of University in Palestine and Algeria: A Comparative Field Study

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Received: October 5, 2017

Accepted: October 29, 2017

Online Published: November 28, 2017

doi:10.5539/ass.v13n12p160

URL: <https://doi.org/10.5539/ass.v13n12p160>

## Abstract

The current study aims to measure the level of political trends of University's youth in Palestine<sup>♦</sup> and Algeria. A questionnaire has been used for collecting data about the opinions of a sample of students at Al - Najah National University of Palestine and Kasdi Merbah University of Algeria enrolled in the academic year 2015- 2016. The study has adopted the Statistical Package for the Social Science (SPSS) for the purposes of measurement. It has concluded that the nature of the political trends of the university youth at the Palestinian University tends to the negative level more than the positive one due to the conditions of occupation and political instability in the Palestine arena. On the other hand, the nature of the political trends of the university youth in the Algerian university tends to the positive level more than the negative one. This is due to the state of political stability characterized by the political system in Algeria, as well as the political reforms that have positively affected the nature of the political trends of the university youth since President Abdul Aziz Bouteflika took power in Algeria, down to creating a higher council for youth in the new constitutional amendment of 2016.

**Keywords:** Political Trends, Political Tendencies, Political Belief, Palestine, Algeria, Youth

## 1. Introduction:

The political trends of young people are an urgent and important issue because they convey the facts according to the viewpoint of their owners. Political trends are one of the most important outcomes of the process of political socialization. They are also the main momentum for the individual behavior in society. Alport was one of the first people who interested in the concept of trend. He defined it as one of the cases of mental and neural preparedness that is organized by experience. It directs the individuals' responses of different things and situations (Al- Abaidi, 2009), whether negatively or positively, towards a situation in the environment that determines positive or negative values to this conduct. There is a view that trend is a psychological readiness which is based on what a person goes through (Seidik, 2012). Thus, a person constitutes an opinion about certain thing, event or issue, either by acceptance, rejection or opposition, because he was faced by a particular experience relating to that thing, event or issue. It is also characterized by being acquired and relatively stable (Nashwan, 2001). According to some researchers, trend is a disciplined and organized determinant for individual's behavior, as well as it is an organized and consistent methods of thinking, behavior and reactions towards people, groups, and social and political issues (Zu'bi, 1994). According to many scholars, it is one of the most important components of the individual's personality, as it constitutes the real component that directs the behavior of the individual and drives him in situations that require responding to any matter with acceptance or rejection (Al- Rawadbeh, 2000). It is an indicator of the value or belief behind it (Marshall, 2000). For this, a large number of political psychology researchers confirm that political trends directly affected the vision of individuals of the objectives and programs of political forces, organizations and parties, and promote their belonging to some of them (Hijazi, 2009). Additionally, they affected individual's response to political issues that require a reaction according to personal experience (Abdali, 2003). This matter creates impressions and feelings towards the political system and its roles, men and achievements. Such feelings and impressions may be attractive, repulsive or unacceptable (Sharap, 1998). This is why Gabriel Almond described political trends as individual's view of the political system in its various parts and his role in the system as a political actor (Almond & Verba, 1965). Based on this vision, he pointed out four dimensions: first, the citizen's vision of the political system in general, the extent of his national feeling, and his vision of the nature of the state to which he belongs. Second, the functions of inputs have been evaluated by the citizen. This is done by determining the extent of his sensitivity to his effectiveness and his impact on governmental decisions whether locally or nationally. Third, the citizen's vision and response to the outcomes of the political system by knowing his views on government's decisions and policies. Fourth, the view of the citizen of his role as a partner in the political system and his ability to affect the decision- making and government's policies

<sup>♦</sup> We mean the questionnaire of the scientific article by Yaser Nimer Hamed entitled: " Political Trends among the Students of the Palestinian University: With applying to the Students of Al- Najah National University. *Al- Aqsa University Journal*, 19(2), 327-357. (2015).

(Almond & Verba, 1965). According to Almond, political tendencies such as trust in institutions and incumbents are highly variable due to differences in the rates of political performance (Almond, 1990). Ghanem attributed this to several factors, which affect the citizen's attitudes towards political power (Ghanem, 1983). These factors are the following:

- 1- Political effectiveness: it means the individual's assessment of his skills and effectiveness in order to understand and deal with politics.
- 2- Political engagement: it means that the citizen feels his active political role in society.
- 3- Political uncertainty: it means citizens' little confidence in the existing political institutions and their performance and effectiveness (Al- Abaidi, 2009).
- 4- Approaching the political process: it means that the citizen is aware of the positive and negative effects left by the political process on their daily lives, in the sense of appreciation of the individual's perception of the political system and what this system offers.
- 5- Political satisfaction: it means that the actions of the national government or the local one improve the citizen's conditions.

Thus, trend is the process of linking knowledge, emotions, and behaviors together in an organized structure, although these three components are not fully consistent with each other. Concurrently, the importance of the emotional element has been increasingly emphasized because it is the strongest among the components of the psychological trend on the one hand and it is closely related to individual's exhaustive energies on the other. The process of the change of trends is influenced by a set of factors: Some of these factors concern the individual himself. When individual is more open to experiences, he is more receptive to adjust his trends. The other relate to the matter of trend itself. When the matter is more connected to the individual and his personality, trend is less likely to be altered or modified (Nchwati, 1996).

Studies related to the role of Palestinian and Algerian youth as actors in political life and their relationship to political system have shown that there is a relationship characterized by a negative attitude. This is clearly demonstrated in the youth's meager participation in political life, especially the national elections of the two countries. This is due to the youth's feeling that political systems cannot formulate new public policies that meet their demands. Therefore, confidence in political systems has been badly shaken. Also, apathy and political alienation became prevalent feelings among young people.

The political conditions were strained in Palestine. However, radical changes in the political conditions have been occurred in Algeria. The current political leadership headed by President Abdul Aziz Bouteflika has done its best to restore the confidence of the young people in the political system by making a set of reforms at various levels. The most important of these reforms was the empowerment of young people and making them a key partner in the formulation of public policy, leading to the establishment of a Higher Council for Youth in the last constitutional amendment in 2016 (Law No. 16- 01, 2016). Therefore, the study seeks to investigate the nature of the political trends of Palestinian and Algerian university youth and tries to compare the two cases.

The argent reasons for comparing the two cases in terms of the political trends of youth are determined in the following:

### *1.1 Similarity*

There is a similarity in:

- ❖ The nature of government order: both countries adopt the democratic system and elections to get to power and its deliberation.
- ❖ Similarity in the sample: the two samples represent the university youth in Palestine and Algeria.
- ❖ Similarity in political culture of the youth of the two countries.

### *1.2 Difference*

Despite the similarity of the government system in both countries, the situation of each regime is different from the other. The Palestinian political system is characterized by political instability, while the situation of Algerian political system is characterized by political stability.

Accordingly, the research aims to measure the level of political trends of university youth in Palestine represented by Al- Najah National University's youth, and in Algeria represented by Kasdi Merbah's youth. Also, the study tries to clarify the nature of these trends by measuring feelings of suspicion, political trust, and political ability and effectiveness towards the system and the political process, and towards also the young people as a political actor in making the public policies.

In order to reveal the nature of the political trends of youth, the predicament of study was determined in the following main question: what is the nature and level of the political trends of the university youth in Palestine and Algeria towards the political system and its institutions and the political process, and towards youth themselves as actors?

In order to answer this question, the study presented the following two preliminary hypotheses:

- ❖ University youth in Palestine and Algeria still have a low degree of political trust in the political system and its institutions, and in the political process.
- ❖ University youth in Palestine and Algeria still have a weak degree towards the competence and effectiveness of the political system and its institutions and towards themselves as actors in public policy- making.

To achieve the objectives of the study, the analytical descriptive, the comparative and survey approaches are adopted by using a survey questionnaire measuring the nature of the political trends of university youth in Palestine <sup>(1)</sup> represented by students of AL- Najah National University, and in Algeria <sup>(2)</sup> represented by students of Kasdi Merbah University at Ouargla (South Algeria) <sup>(3)</sup>. The questionnaire has been distributed by a random sample of 600 students enrolled in the 2015/2016 academic year. Students were from theoretical and practical collages. The reliability and stability of the sample has been verified by using the measure of Cronbach's Alpha. The degree of the stability of political trends measure in all its indicators amounted 0,922 <sup>(4)</sup>, which means it is reliable in measurement. The questionnaire was also judged by Professors specializing in political science, sociology and statistics <sup>(5)</sup>. The collected data have been analyzed and processed by using Statistical Packages for Social Science (SPSS). The study has divided the levels of political trends into three levels: weak, medium and good <sup>(6)</sup>.

**2. First, measuring the trends of suspicion and confidence in the system and its institutions and in the political process**

To determine the level and nature of political trends for suspicion and confidence, this indicator has been divided into phrases measuring confidence and suspicion in the political system and its leader as symbols of it, and other phrases measure confidence and suspicion in the system's institutions, down to phrases that measure the trends of young people in the political process, the degree of confidence in its strength and the extent of submission to it (Abdul Jalil, 2014). The sense of mutual political trust between the political system and the individual make him ready to cooperate with others in society and work on the basis that he has an important role no less important than political officials' role (Sirag, 1998), raising the level of loyalty and association with the system. However, the lack of confidence in the system and the poor performance and effectiveness of its existing political institutions (Ghanem, 1979) has a negative effect, which increases the sense of alienation and psychological isolation from the system, additionally, the lack of sense of responsible citizenship with its rights and obligations (Dahl, 1966). In order to verify this, the researcher assumes, based on the evidence of many studies on youth and politics in Palestine and Algeria, that university youth in Palestine and Algeria still have a low degree of political confidence in the political system and its institutions, as well as in the political process.

The field results of Palestine students from Al- Najah National University have showed a high level of suspicion and mistrust in the Palestinian political system and its institutions (Abu Hamid, 2015). On the other hand, the field results shown in Table (1) for Algerian students from Kasdi Merbah University have illustrated the high level of trust in the political system and its institutions <sup>(7)</sup>. Some 32,3% of the respondents were of good grade, 43% were of a medium degree, and only 24,7% were of a low degree of trust in the political system and its institutions.

Table 1. Measuring trends of suspicions and trust in the system and its institutions.

Measuring trends uncertainty and trust in <i>system and its institutions</i>	<i>percentage</i>
<i>Weak (0 – 1.6)</i>	24.7 %
<i>Medium (1.7 – 3.3)</i>	43 %
<i>Good (3.4 – 5)</i>	32.3 %
<i>Total</i>	100 %

The low level of confidence in system and its institutions among the sample of Al- Najah National University in Palestine attributes to the political division since 2007. This division has begun to constitute a general opposed trend due to its negative impact left on Palestinian's life. Locally, Palestinians have been severely affected by this division because it served as an obstacle to civil and political freedom in both the West Bank and Gaza Strip. It has contributed to the emergency of extremist currents and has encouraged the spread of political violence. Such division also has increased the status of discrimination based on the political affiliation that led to inequality between Palestinian citizens. Furthermore, it has obstructed the role of many institutions such as the parliament, which is no longer able to play its legislative and supervisory roles (Abu Hamid, 2015). In the Algerian case, the high level of positive trend towards confidence in the political system and its institutions among the university youth in Algeria reflects their understanding of the political system which works for the benefit of the people and its institutions, especially the judiciary. These institutions enjoy integrity and are keen to preserve all the rights and duties of all Algerian citizens. The study attributes this matter to the significant change occurred in the method of political action since 1999. Such method adopted by the government aimed to ensure the independence of judiciary, reform the state's institutions and consolidate democracy (Kadari, 2005).

On the other hand, the results of the field research regarding confidence in the political process confirmed that the predominant trend among the sample of the students of Al- Najah National University in Palestine was high (Abu Hamid, 2015). While the results of the field research shown in table (2) confirmed that the predominant trend among the sample of the students of Kasdi Merbah University in Algeria was positive <sup>(8)</sup>. The degree of confidence in the

political process of about 41.7 % respondents was good, 32.3 % was medium, and 26 % was weak.

Table 2. Measuring trends of uncertainty and trust in the political process.

Measuring trends of uncertainty and trust in political process	percentage
Weak (0 – 1.6)	26 %
Medium (1.7 – 3.3)	32.3 %
Good (3.4 – 5)	41.7 %
Total	100 %

The low level of confidence in the political process reflects the awareness of the students. Israel has exploited the state of political division in the Palestinian arena by imposing punitive practices against Palestinian in Gaza Strip, which served as an obstacle to unity, peace, tolerance and political freedom.

In their responses to the paragraphs of the questionnaire, the students also stated that the completion of the Palestinian reconciliation is the best option to pressure Israel and support the Palestinian negotiator within the framework of the peace process. Simultaneously, they expressed their satisfaction with the university's policies that allow them to participate in non- academic activities within the university, promote the values of belonging, freedom and social justice, and provide them with opportunities to participate in political conferences and seminars related to the Arab-Israeli conflict (Abu Hamid, 2015). In contrast, the high level of those who believe that the political process, in general, is fair and transparent (Abdel Halim, 2004) reflects the awareness of respondents of Kasdi Merbah University of the importance of the integrity of the political process. Some people see the opposite is true. However, the study attributes the high positive level to the political reforms adopted by President Abdelaziz Bouteflika such as the amendment of the election law, the transparency of the political process in general (Karbousa & Aknoush, 2005), and making the citizen a partner in the political process. According to results, the hypothesis of the Palestinian case will be accepted, but the hypothesis of the Algerian case will be rejected.

### 3. Second, measuring the trends of ability and effectiveness towards the system and its institutions and young people as a political actor.

In order to uncover the level and nature of the trends of university youth in Palestine and Algeria towards the political effectiveness and competence, this indicator is divided into phrases that measure the feelings of university youth towards effectiveness and competence of the political system and its institutions, and towards themselves as political actors. The first means the the view of individual about power, whether he see it as necessary for him or not, and whether it benefits him or benefits only those occupying key positions (Noir, 2001). In addition, approaching the political process plays a major role in the citizen's awareness of the positive and negative effects of the political process on its daily life. Put differently, assessing the individual's perception of the political system and what it has to offer gives him the feeling that the actions of the national government or the local one are improving his conditions (Ghanem, 1983). The second is the tendency of the individual towards himself as a political actor, which means that the individual has the ability to impact in the course of political life by the constructive criticism of any political official or showing his opinion on various issues, with the conviction that his opinion is valuable to the decision-maker. In this vein, it is possible to distinguish between individual's sense of being a political actor who is capable of making an actual change or his sense of incapacity where political decisions are issued and his opinion has no effect in any way even slightly (Ghanem, 1981). If the individual's opinion and criticism does not affect the course of political events or this effect is very limited, he will tend to negativity and apathy, and vice versa. If the individual's opinion was influential, he would become more interested in politics (Garaybeh & Nofal, 2004). In order to measure the nature of these trends, the study also hypothesized that university youth in Palestine and Algeria still have a weak degree towards the competence and effectiveness of the political system and its institutions and towards themselves as actors in public policy- making.

The statistical results have shown that the level of the positive trend of the indicator of political effectiveness and competence of university youth in Palestine towards the Palestinian political system and its institutions was low (Abu Hamid, 2015). As for respondents' opinions at Kasdi Merbah University, we find that the field results shown in table (3) recorded a high level of the positive trend of the political effectiveness and competence of university youth in Algeria towards the system and its institutions <sup>(\*\*\*\*)</sup>. 35.8 % of respondents were at a good level, 41.9 % were at a medium level, and 22.3 % were at a weak level.

Table 3. Measuring trends of competence and effectiveness towards the political system and institutions

measuring trends of competence and effectiveness towards the political system and institutions	percentage
Weak (0 – 1.6)	22.3 %
Medium (1.7 – 3.3)	41.9 %
Good (3.4 – 5)	35.8 %
Total	100 %

The study found that the weak percentage of the confidence of Al- Najah National University's students in the efficiency of the Palestinian system and its effectiveness in achieving the peace process and ending the state of division is due to inequality in power balance between the Palestinian political system and Israel. According to Palestinians, there has been no change in the peace process since 1993. Israel has worked to confiscate more lands and intensified the construction of settlements in the Palestinian territories in order to impose fait accompli policy, which prevents the establishment of Palestinian state. It wants the peace process to achieve its goals by expanding and further confiscating Palestinian territories, which is an obstacle to peace (Abu Hamid, 2015). On the contrary, the level of political competence and effectiveness of university youth in Algeria was high. According to the study, this is due to the political reforms adopted by President Bouteflika, which raised the level of actual performance of political, economic and social institutions (Hamzawy, 2003). The beginnings of the reforms were represented in alleviating the political violence, restoring security, and bringing the administration and institutions closer to the citizens (Tashma, 2010). These previous matters led to meeting the requirements of the citizen, paying off foreign debts, working to absorb unemployment (Khadran, 2012), and seeking to achieve economic development.

In terms of self- orientation as a political actor for Al- Najah National University's respondents, the results of the field research showed a weak level (Abu Hamid, 2015). Thus, the results of the field research in the Algerian case, as shown in table 4, have illustrated the high level of positive trend of respondents towards their political ability and effectiveness (\*\*\*\*). 41.5 % of respondents have a good level of political ability and effectiveness if the opportunity is given to them to make political decision. The level of the political effectiveness of percentage 30.3 % of respondents recorded a weak level.

Table (4) measuring trends ability and effectiveness of youth as a political actor

Measuring trends ability and effectiveness of youth as a political actor	percentage
Weak (0 – 1.6)	28.2 %
Medium (1.7 – 3.3)	30.3 %
Good (3.4 – 5)	(41.5) %
Total	100 %

The researcher attributes the weakness of the level of orientation towards the self as a political actor for Al- Najah National University to their conviction that they cannot affect decision and policy making. This influence cannot be achieved in light of the continued state of political division in the Palestinian arena. Therefore, they call for negotiations and they believe that negotiations are the best way to achieve the best way to achieve Palestinian demands and resorting to the United Nations again will siege Israel which leads it to meet the demands of the Palestinians (Abu Hamid, 2015). The study also attributes the high level of positive trends towards the political ability and effectiveness of the university youth's respondents in Algeria towards themselves as political actors or if they are given the opportunity to achieve this and participate in political decision- making to a set of policies and laws adopted by President Bouteflika aimed at empowering young people and making them partners in all fields, especially the political field. Since the hypothesis claimed a weak level of the two cases and the results of the study proved the opposite, the hypothesis would be accepted in the Palestinian case and would be rejected in the Algerian one.

#### 4. Conclusion

After reaching the results of the study and the answer of its hypotheses, it has been found that the nature of the political trends of the university youth in Palestine tends to the negative level more than the positive one. This attributes to the conditions of occupation and political instability in the Palestinian arena. In contrast, the nature of the political trends of the university youth in Algeria tends to the positive level more than the negative one. This is due to the state of political stability characterized by the political system in Algeria, as well as political reforms adopted by President Abdul Aziz Bouteflika. These reforms have positively affected the nature of the political trends of university's youth in Algeria. The political system has sought first to achieve internal security and peace by adopting the two harmony and reconciliation laws (Qubi and Bushnaka, 2005). It also has consolidated democracy. Furthermore, it has adopted the policy of good governance the empowering youth and women and involved them in various governance and administration fields (Shibli, 2009), the establishment of the principle of transparency and accountability through approving anti- corruption act (Zarraka, 2007), reforming and developing the economy and tackling the social problems, especially unemployment (Khadran, 2012). In addition, we should not forget the restoration of Algeria's international status (Lunisi, 2000). These reforms made the institutions close to the citizen, and played a positive role in changing the political trends that characterized previously by negative, reluctance and the feeling of political alienation, but characterized now by positivity and participation.

#### 5. Recommendations

Based on the aforesaid conclusions, the study set a number of recommendations. They are as follows:

##### 5.1 As for the Palestine case:

It is necessary to eliminate the state of acute political division among the Palestinian factions and promote the practices of participation, democracy, tolerance, the abandonment of violence, cooperation and affiliation. This is done by

holding seminars, conferences, lectures, meetings, discussions and interviews, which enhance student's positive political trends. Thus, students can be rallied around one political will that will enable them to be changed to the best and give them the ability to be influential in political decision- making.

### 5.2 As for the Algerian case:

In order to preserve these gains, more reforms should be made regarding the political practice and enhancing the status of youth, not only as partners, but also as leaders in the state.

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### Notes

We mean the questionnaire of the scientific article by Yaser Nimer Hamed entitled:” Political Trends among the Students of the Palestinian University: With applying to the Students of Al- Najah National University.

The questionnaire consist of (25 phrases) divided into three axes: the first (3 phrases), especially the student’s data (collage, gender, level of study). The second axis includes (8 phrases) that measure the confidence and doubt in the political system and its institutions, and the political process. The third axis includes (14 phrases) that measure the indicator of political competence and effectiveness in the political system and its institutions, and the youth as a political actor.

Kasdi Merbah University is located in Ouargla governorate in the south east of Algeria, 800 km away from the capital, Algeria. the first nucleus Kasdi University was established in September 1987.it has witnessed many transformations in its organizational and pedagogical structure. According to executive decree No. 13 – 100 of 2 Jumada Al- Awal, 1434, corresponding to March 14, 2013, amended and supplemented by executive decree No. 01-210 of Jumada Al- Awal, 1722, corresponding to July 13, 2001, Kasdi Merbah University currently consists of 10 theoretical and practical colleges, where they receive students from all over the country.

The measure of Cronbach’s Alpha is used to measure the stability of instrument, and stability and accuracy of questionnaire (the stability accuracy of the study means it measure the questionnaire’s questions in terms of its actual measurement and the clarity of questionnaire and its terms and definitions for those who will be included in the questionnaire and will be valid for the statistical analysis). When the measure of Cronbach’s Alpha approach to (1), the stability of instruments is stronger.

The arbitration of questionnaire: Cairo University, Prof Dr. Al-Sayed Abdul Mutallab Ghanem, Prof. Dr. Safi Al- Din Kharbush, Prof. Dr. Ahmed Magdey Hijazi, Prof. Dr. Ahmed Gad. From Kasdi Merbah University: Prof. Dr. Adam Kabbi.

\*In order to build the indicators of the political trend measure, the study has been based on determining how weights are given to these indicators because weights have a profound impact on the results of the composite indicator. The method of equal weight is used in this study. This method is based on the same weight for each of the indicators because there is no clear evidence of the different importance of each of these indicators, and then convert this indicator to a normative indicator, meaning that its value ranges from 1- 5 by the normative indicator = (the original value of the indicator- the minimum indicator) / range. By aggregating these indices and dividing them by their numbers, we obtain the composite indicator. This indicator is a standard of between (1- 5), then redistributed to three levels (good: strongly agree, agree) (medium: natural), (Weak, I disagree, strongly, disagree).

\*\* With a stability of 0.769. The credibility and stability of the confidence and uncertainty indicator in the political system and its institutions were verified using the measure of Cronbach’s Alpha.

\*\*\* With a stability of 0.758, the validity and stability of the confidence and uncertainty indicator in the political process was verified using the measure of Cronbach’s Alpha.

\*\*\*\* With a stability of 0.885. The credibility and stability of the political competence and effectiveness indicator in the system and its institutions were verified using the measure of Cronbach’s Alpha.

\*\*\*\*\* With a stability of 0.777, the validity and stability of the youth’s competence and effectiveness indicator was verified as a political actor by using the measure of Cronbach’s Alpha.

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# Analyzing the Teaching and Learning of Mathematical Reasoning Skills in Secondary School

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Received: October 5, 2017      Accepted: October 29, 2017      Online Published: November 28, 2017  
doi:10.5539/ass.v13n12p167      URL: <https://doi.org/10.5539/ass.v13n12p167>

## Abstract

The paper reports part of a study aimed at developing teaching materials in inculcating upper secondary students' mathematical reasoning skills (MRS). To develop the materials, the researcher implemented the Four-D Model. The study took subjects from five public schools in Province of North Sumatera, Indonesia. The researcher designed and developed students' work sheet (SWS) and instrument to measure MRS. Along the teaching ran, which applied problem-based learning model, the researcher observed teachers' and students' activities while nurturing and applying MRS in the frame of solving mathematical problems. Of the four indicators laid to measure the MRS, students lack most in use of pattern relationship to analyse situation, to make analogy, or to generalize. The ways support student's progress in achieving MRS are if (i) the problem faced is much mimicked the task solved in the classroom, (ii) more various problems given to solve under guidance, and (iii) intensive scaffolding is given.

**Keywords:** Analyzing, Teaching and Learning, Mathematical reasoning skills (MRS)

## 1. Introduction

Appealing for making higher order thinking the ultimate goal as the outcome of mathematics education had been launched since eighties (Branca, 1980; NCTM, 1989; National Research Council, 1989; Resnick, 1987; Schönfeld, 1985). On one side, schools should prepare students to live in the twenty first century, which predicted to be full of uncertainty and bounded natural resources. To be survive, they should be smart, that is capable and competent in higher order thinking such as reasoning, logical, critical, and creative in the frame of problem solving. On the other side, they should have, to some extent, perseverance, self-regulated learning, self-efficacy, and positive attitude to doing mathematics. Being smart and having good character, they become productive citizens.

If students are to learn mathematics, it is far from enough just asking them to memorize formula and to apply procedures, but they should be also able to reason or to think critically and creatively (Minarni & Napitupulu, 2017). Stein, Grover, and Henningsen (1996) emphasize that it should stress on students' full understanding of mathematics, which consists of more than knowledge of mathematical concepts, principles, and their structure. The writers continued that mathematics educators and philosophers had convincingly argue that full understanding includes the capacity to engage in the processes of mathematical thinking, in essence doing what makers and users of mathematics do: framing and solving problems, looking for patterns, making conjectures, examining constraints, making inferences from data, abstracting, inventing, explaining, justifying, challenging, and so on. In a similar manner, Romberg (1992) stated students should not view mathematics as a static, bounded system of facts, concepts, and procedures to be absorbed but, rather, as a dynamic process of "gathering, discovering and creating knowledge in the course of some activity having a purpose" (p. 61). To sum up, learning mathematics should push up to doing mathematics in which learners solve problems by applying their understanding and reasoning.

Reasoning is the primary and continuously tool one employs when trying to understand mathematics or to solve problems in mathematics. Since in reasoning, one attempts to relate facts, concepts, or principles one into another; looks for pattern emerged and makes effort to generalize or logical conclusion, and makes conjecture and simultaneously its proof (NCTM, 2000; O'Daffer & Thornquist as cited in Artzt & Yaloz-Femia, 1999). By relating objects and/or draw logical conclusion, one builds his understanding on the problem posed. He then apply his understanding and reasoning to solve problem he faces. To sum up, understanding triggers reasoning take place and in turn by reasoning, one improves his understanding. The process occurs cyclically. This shows mathematical reasoning is essential and at the heart of understanding and problem solving processes.

Researchers have paid much attention to reveal students' mathematical reasoning and proving proficiency in different countries and they found that students face serious difficulties when working in this domain (Stylianides, 2009). TIMSS reported similar result for fourth and eighth grade students (Mullis, et. al, 2012). In the same report, Indonesian eighth graders only achieved 17%, which is equivalent to score 388; meanwhile international average was 30% equivalent to score 465. For upper secondary school, Napitupulu, Suryadi, & Kusumah (2016) reported students' MRS in PBL classroom was 39% while in the conventional one was 33%. Students lack most at give explanation on model,

fact, properties, relationship, or pattern exists. The low achievement indicates that treatment should take place to overcome the problem.

Despite the low achievement, Bieda (2010) found it still know very little about how skills related to justifying and proving are taught in school mathematics - particularly in mathematics courses outside of high school geometry. She further asserted:

Research has not examined students' opportunities to develop deductive reasoning and to learn skills for evaluating the validity of others' mathematical arguments. Without such opportunities, students are inadequately prepared to participate in meaningful discussions about mathematical proofs and to explore the variety of roles a proof can play in doing mathematics... To understand how to change the ways in which students learn to prove in school mathematics communities, we need to understand how teachers, students, and the curricula they use - elements existing at the nexus of school mathematics communities - interact in classroom settings when students are discussing and developing justifications and proof.

Concerning to the statement Bieda posed, this study attempted to nurture and facilitate students to develop their mathematical reasoning skills by means of solving problems. Doing so, they have chances discussing the validity of arguments they construct and relating knowledge and experiences to gain deep understanding.

### 1.1 Mathematical Reasoning Skills

As asserted earlier, to understand or to solve problem in mathematics, the primary and main tool one make use is reasoning. It is important to note, Lithner (2000) emphasizes that reasoning is the foundation of mathematics (p. 165). He continues arguing that if reasoning ability is not developed in the student then mathematics simply becomes a matter of following a set of procedures and mimicking examples without thought as to why they make sense. If this is the case, it would certainly lead students considering mathematics as a boring subject and something nothing to do with and the ultimate goal of learning mathematics would be put aside accordingly.

The study referred to Lithner definition on reasoning i.e. as the line of thought, the way of thinking, adopted to produce assertions and reach conclusions. The reasoning concerns the transfer of properties from one familiar situation to another (task solving) situation that has at least superficial resemblance to the familiar situation (p.167). Whereas argumentation is the substantiation, the part of the reasoning that aims at convincing oneself, or someone else, that the reasoning is appropriate (p.166).

The study grounded its framework on the work of Lithner (2003). The author classifies reasoning into plausible reasoning (PR), established experience (EE), and identification of similarity (IS). This classification based on three parts, which he called *reasoning structure, components* and *properties*, and *reasoning characteristics* (p.31). According to Lithner, one way to structure the reasoning is:

1. *A problematic situation* is met where it is not obvious how to proceed.
2. *Strategy choice*: Try to choose (in a wide sense: choose, recall, construct, discover, etc.) a strategy that can solve the difficulty. This choice can be supported by *predictive argumentation*: Will the strategy solve the difficulty?
3. *Strategy implementation*: This can be supported by *verificative argumentation*: Did the strategy solve the difficulty?
4. *Conclusion*: A result is obtained, (p.31-32).

A sequence of mathematical reasoning is classified as PR if *strategy choice* and *strategy implementation*: (i) is founded on intrinsic mathematical properties of the components involved in the reasoning, and (ii) is meant to guide towards what probably is the truth, without necessarily having to be complete or correct. Meanwhile, the reasoning is classified as EE if the argumentation (i) is founded on notions and procedures established on the basis of the individual's previous experiences from the learning environment, and (ii) is meant to guide towards what probably is the truth, without necessarily having to be complete or correct. Last, the reasoning is classified as IS if it fulfils (i) the strategy choice is founded on identifying similar surface properties in an example, theorem, rule, or some other situation described earlier in the text. (ii) The strategy implementation is carried through by mimicking the procedure from the identified situation.

Based on the work of Napitupulu, Suryadi, & Kusumah (2016), the study laid four indicators to measure students' MRS, that is to say: (a) Draw logical conclusion; (b) Give explanation on model, fact, properties, relationship, or pattern exists; (c) Make conjecture and proof; and (d) Use of relationship pattern to analyse situation, to make analogy, or to generalize.

### 1.2 Problem-Based Learning

One of model of teaching that promote students engagement in building new knowledge based on previous knowledge and experiences is problem-based learning (PBL). PBL is an instructional method in which students learn through solving problems and reflecting on their experiences (Barrows & Tamblyn, 1980). According to Barrows (1996), there are six characteristics of PBL, i.e. (i) learning is student-centered, (ii) learning occurs in small group, (iii) teacher is facilitator or guider, (iv) problem forms the organizing focus and stimulus for learning, (v) problem is a vehicle for the development of problem solving skill, (vi) new information is acquired through self-directed learning. Considering the characteristics, it is obvious that PBL demand the learners to be active and self-directed with enough previous

knowledge and experience to doing mathematics, especially solving problems by exploiting and exploring their reasoning skills.

Hmelo-Silver and Barrows (2006) emphasize, in PBL, students have the opportunity to develop skills in reasoning and self-directed learning. PBL requires students to become responsible for their own learning. The PBL teacher is a facilitator of student learning, and his interventions diminish as students progressively take on responsibility for their own learning processes. (p.24). Consequently, students who are not accustomed to learning collaboratively, self-directed, solving problem, and do not have perseverance usually feel inconvenient and refuse learning in such a way. In this case, to assure PBL run as it should be teacher-facilitator should take role more to motivate, scaffold, direct, and control students learning. This is also stressed in Collins, Brown, & Newman (1989), “the facilitator guides students in the learning process, pushing them to think deeply, and models the kinds of questions that students need to be asking themselves, thus forming a cognitive apprenticeship”. For students new to PBL, role of teacher-facilitator is key and critical. Students, who are stuck in effort to solving problem, should immediately addressed for helping. Hmelo-Silver and Barrows (2006) argued:

Facilitators make key aspects of expertise visible through questions that scaffold student learning through modelling, coaching, and eventually fading back some of their support. In PBL, the facilitator is an expert learner, able to model good strategies for learning and thinking, rather than providing expertise in specific content. This role is critical, as the facilitator must continually monitor the discussion, selecting and implementing appropriate strategies as needed. As students become more experienced with PBL, facilitators can fade their scaffolding until finally the learners adopt much of their questioning role.

### 1.3 Research Questions

The study intended to answer these subsequent questions:

(Q1) In what task did students most fail and in what task did they succeed? How did the learning process predict that phenomenon?

(Q2) In what ways did the learning process support students’ progress in achieving the MRS?

## 2. Methodology

The research is developmental in nature. Subjects were students from five A-rank public upper secondary schools from each one classroom is taken. Five regular teachers in each classrooms taught during the research and the researcher and one other teacher observed while the teaching and learning processes proceed. The researcher administered pretest and posttest, which consisted of four problems for each, derived from four indicators mentioned earlier to measure students’ MRS. The researcher applied the holistic rubric scoring to assess students’ work on MRS (Table 1).

Table 1. Holistic Rubric for Scoring Students’ MRS

Criteria	Score
Solution is correct and complete. Reasoning in solving problem and its communication are complete. Adequate explanation on the solution, contain a little defect.	4
Solution is correct. Good reasoning in solving problems and its communication. Explanation on the solution exists though contain some defect.	3
Complete solution does not emerge. Adequate reasoning in solving problems and its communication. Defect reasoning emerge clearly. Inaccurate conclusion. Limited understanding on mathematical concept.	2
Problem emerges while imitating mathematical idea and unable to develop. Lack of reasoning and its communication. A lot of incorrect calculation emerge.	1
No solution exist. No reasoning in solving problem. Neither mathematical understanding nor response on possibilities emerges. Just guessing.	0

The teachers conducted lessons for four meetings. SWS 1 contains nine problems and needed two meetings to complete. At the first lesson, the teacher oriented each group to work on problems in the previous part or SWS 1. The problems in SWS 1 were intended to inculcate the ability in drawing logical conclusion and give explanation on model, fact, properties, relationship, or pattern exists, and use of relationship pattern to analyse situation, to make analogy, or to generalize. Tasks in SWS 1 constitute establishing trigonometric comparison in the four quadrants of Cartesian plane and related angles and apply it to solve related problems. SWS 2 contains six problems, which is intended to inculcate students’ skill in all the four indicators mentioned earlier. The last SWS contained five problems. Similar to SWS 2, all of the problems in SWS 3 pursuit the four indicators mentioned above. All tasks are based on sine rule. SWS 2 and 3 each needed one meeting. The tasks were adopted from Sinaga, et al (2014) textbook and book of Thong and Hiong (2006). While conducting lesson, the teachers gave scaffolding and nurtured students, either classically or in-group, to solve problems. The collected data then were analysed quantitatively and qualitatively.

## 3. Results and Discussion

### 3.1 Students’ Performance on MRS Test

There were four problems posed to measure students’ performance on MRS either pre-test or post-test. Pretest problems are about exponent, basic trigonometry, matrix, and system of linear equation of two variables. The students

have already learned all of the materials before tested. Meanwhile, the posttest problems are about trigonometric comparison of related angles, trigonometric identity, and cosine rule. Table 2 showed the distribution of pre and posttest problems into each RMS indicator. Table 3 showed each indicator with its related problem. Since problem number 1 and 2 simultaneously measure both indicator 1 and 2, they are put in the same box. Table 4 presents percentage of students' achievement on the both tests refer to holistic rubric of scoring for each problem. Score zero up to two means underperformed and score three or four means performed. To say differently, score zero up to fifty means underperformed and more than fifty up to one hundred means performed in 100-scale.

Table 2. Blue Print of RMS Indicators and Related Pre and Posttest Problems

Indicator	Problem number	
	Pre test	Post test
Draw logical conclusion ( $I_1$ )	1	1 and 2
Use of pattern relationship to analyse situation, to make analogy, or to generalize ( $I_2$ )	2	1 and 2
Make conjecture and proof ( $I_3$ )	4	3
Give explanation on model, fact, properties, relationship, or pattern exists ( $I_4$ )	3	4

Table 3. RMS Indicators and Its Related Problem

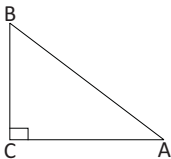
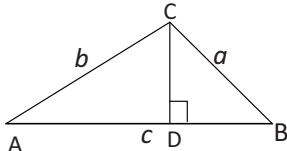
Indicator	Problem
1. Draw logical conclusion.	1. Let $x = \sin \theta - 2 \cos \theta$ and $y = 2 \sin \theta + \cos \theta$ . Determine $\sin \theta$ and $\cos \theta$ in $x$ and $y$ . Then establish relationship between $x$ and $y$ .
2. Use of pattern relationship to analyse situation, to make analogy, or to generalize.	2. Look at $\triangle ABC$ below. Explain why $\sin \angle A < 1$ , and $\sin \angle A < \tan \angle A$ ? 
3. Make conjecture and proof.	3. Look at $\triangle ABC$ below. $CD$ is one of its height. By using sine for $\angle A$ , determine the area of the triangle. What is the formula if you use $\angle B$ ? What if $\angle C$ ? Prove your answer. 
4. Give explanation on model, fact, properties, relationship, or pattern exists.	4. Verify that $\tan \theta - \operatorname{cosec} \theta \sec \theta (1 - 2 \cos^2 \theta) = \cot \theta$ .

Table 4, for posttest, tells us that the students were most succeed in task “Make conjecture and proof” (problem 3). They were less succeed in task “Give explanation on model, fact, properties, relationship, or pattern exists “(problem 4). On the contrary, for pretest, they exactly were worst in those tasks. At the other side, for pretest, nearly half of them succeed on tasks 1 and 2 but for posttest, they were totally failed. This is undoubtedly contradictory.

Actually, some tasks in SWS 1 and 2 had facilitated students to establish a relationship between two variables when a pair of equations given. While working on the tasks, their teachers helped by giving scaffolding at many occasions. It was hard for them to discover the way to connect terms contained in the equations. Furthermore, they failed to recognize what algebraic operation should take place to make it closer to the goal. The result the students achieved in this case was predicted by their work on problems of the SWS. The discrepancy between their achievement in the pretest and the posttest looked due to not only the mathematical content but also the lack of experiences in handling such problems.

From Figure 1, it is readily seen, the student make use his establish experience in handling system of linear equation and applying the substitution method and it works. Therefore, it is an EE category. Unfortunately, he was unable to continue working to establish the relationship between  $x$  and  $y$ . Most of the students did similar work.

Table 4. Students' Performance in Percentage on MRS for Both Pre and Posttest

Problem	Performed Pre/Post	Under performed Pre/Post	Pretest Score (%)					Posttest Score (%)				
			4	3	2	1	0	4	3	2	1	0
1	44/2	56/98	44	0	13	27	16	0	2	23	21	54
2	46/5	54/95	30	16	2	43	9	5	0	53	9	33
3	2/64	98/36	2	0	0	7	91	23	41	34	0	2
4	0/30	100/70	0	0	0	4	96	30	0	23	3	44

1.  $X = 2 \sin \theta - 2 \cos \theta$   
 $\sin \theta = \frac{X}{2} + \cos \theta$   
 $Y = 2 \sin \theta + \cos \theta$   
 $\cos \theta = Y - 2 \sin \theta$   
 $Y = 2 \sin \theta + \cos \theta$   
 $Y = 2(\frac{X}{2} + \cos \theta) + \cos \theta$   
 $Y = X + 4 \cos \theta + \cos \theta$   
 $Y = X + 5 \cos \theta$   
 $\cos \theta = \frac{Y - X}{5}$   
 $\cos \theta = \frac{Y - X}{5}$   
 $X = 2 \sin \theta - 2 \cos \theta$   
 $X = 2 \sin \theta - 2(Y - 2 \sin \theta)$   
 $X = 2 \sin \theta - 2Y + 4 \sin \theta$   
 $5 \sin \theta = X + 2Y$   
 $\sin \theta = \frac{X + 2Y}{5}$

Figure 1. Student Sample Work on Problem 1

One work on problem 2 is shown in Figure 2. This work tells us the type of reasoning the student used is PR. The strategy he chose and implemented based on intrinsic mathematical properties of the component involved but it did not lead him to the solution. He even then wrote something nonsense and remained in a problematic situation. In this case, he actually should take advantage of the familiar situation (right triangle) and establish the trigonometric comparison (EE). He can then combine the definition of sine, tan, and Pythagoras to solve the problem.

2- Since the sum of angles of a triangle is  $180^\circ$ , and  $\angle C = 90^\circ$  then  $\angle B + \angle A = 90^\circ$ . It implies  $\angle A < 90^\circ$  and  $\angle B < 90^\circ$ .  
 We have  $\sin A = 1$  if  $\angle A = 90^\circ$  and  $\sin B = 1$  if  $\angle B = 90^\circ$ .  
 So, we have  $\sin A < \tan A$   
 $\frac{\cos A}{\tan A} < \tan A$   
 $\cos A < 1$   
 $\cos A$  cannot be equal 1 since  $\cos A = 1$  if  $\angle A = 0^\circ$  and if  $\angle A = 0^\circ$  it will not a triangle anymore.

Figure 2. Student Sample Work on Problem 2

The students were most successful at task “make conjecture and proof”. Problem 3 facilitated them to accomplish the work, though not completely. It is clear from Figure 3, they face a familiar situation, that is finding the area of a triangle. This procedure then combined with trigonometric comparison to finish the work. Unfortunately they were unaware their work was not finished yet. This is an EE reasoning.

37.  $\sin A = \frac{CD}{b}$   
 $CD = b \cdot \sin A$   
 $LD = \frac{1}{2} \cdot AB \cdot DC$   
 $LD = \frac{1}{2} \cdot AB \cdot b \cdot \sin A$   
 or until  $\angle C = \frac{CB}{\sin B} = \frac{AB}{\sin C}$   
 $AB \cdot \sin B = CB \cdot \sin C$   
 $\frac{1}{2} \cdot AB \cdot b \cdot \sin A$   
 $= \frac{1}{2} \cdot b \cdot (AB \cdot \sin A)$   
 $= \frac{1}{2} \cdot b \cdot CB \cdot \sin C$   
 $= \frac{1}{2} \cdot CB \cdot b \cdot \sin C$

Figure 3. Student Sample Work on Problem 3

$$\begin{aligned}
 (4) \quad & \tan \theta - \csc \theta \sec \theta (1 - 2\cos^2 \theta) = \cot \theta \\
 & \tan \theta - \csc \theta \sec \theta + 2\cos^2 \theta \csc \theta \sec \theta = \cot \theta \\
 & \frac{\sin \theta}{\cos \theta} - \frac{1}{\cos \theta} - 2\cos \theta \csc \theta = \cot \theta \\
 & \frac{\sin \theta - \csc \theta - 2\cos \theta}{\cos \theta} = \cot \theta
 \end{aligned}$$

Figure 4. Student Sample Work on Problem 4

For the last task, the students employed IS. They mimicked procedure from the identified situation (Figure 4). However, it is not suffice. The fault committed algebraically (distributive) make them more difficult to apply procedure in effort to make the situation simpler toward solution. Therefore, they remained in a problematic situation and could not reach the solution.

Along the learning processes, students worked to solve various problems on trigonometric comparison and functions. SWS 2 problem number 1 and 5 trained them to achieve sepecially skill in I<sub>4</sub>. Problem number 4 in SWS 3 is relatively equivalent in difficulty to problem 4 in the post-test in establishing a relationship between *x* and *y*. Neither one of them was able to accomplish the task in the SWS nor in the posttest. Therefore, students' inability to accomplish the task completely was predicted from their work on this indicator.

Problem 3 of the post-test is exactly a repetition. It was a problem in SWS 3. The result was an image of their work while handling the tasks in the teacher and learning process. SWS 1 problem number 9, SWS 3 problem 2 and 3 support indirectly to accomplish problem 2 of the post-test to grasp I<sub>1</sub> and I<sub>2</sub> competencies. Their work on these problems was better than it was on the post-test. Although at the beginning they start well, but the failure to recognize a familiar situation in hand, made them go unintentionally. Therefore, at this task, most of them only achieved one fourth of the maximum score and it was classified underperformed. SWS 1 problem number 8, SWS 2 problem number 3,4, and 6, and SWS 3 problem number 4 support problem 1 of the post-test to achieve I<sub>1</sub> and I<sub>2</sub>. Their work on these SWS problem really illustrated what they would do on the post-test.

Albeit little, overall the intervention, which took four courses time to accomplish, has successfully improve students MRS. During conducting the lessons, teachers have played their role as facilitator-guider in much occasion, though not optimal. Some of them have followed training how to implement teaching model based on constructivism. However, they very rarely use it in their classrooms. Consequently, they could not conduct the lesson fluently as it should be. For example, the scaffolding they gave was inappropriate to the situation emerged or the scaffolding itself did not emerge. In addition, observation revealed too many groups in the classroom made teachers difficult to give help optimally. Moreover, students' lack of understanding on basic knowledge relating to the tasks, such as Pythagorean properties, algebraic operation, and algebraic properties became other barriers to accomplish the tasks. Besides, their understanding on trigonometric comparison is not firmed yet. As consequence, they were not easily and fast move on to the deeper and challenging task such as posed in the study.

Similar result also obtained in a study of Bieda. She investigated the process and outcome of implementing proof-related tasks in the classroom. She found that students' experiences with such tasks are insufficient for developing an understanding of what constitutes valid mathematical justification. She even showed that in the best of circumstances - teachers with ample experience and professional development using a curriculum that provides multiple opportunities for justification and proof - instruction that supports students' understanding of justification and proof at the middle school level is quite superficial. She continued with suggestion that greater emphasis is needed for middle school teacher preparation, professional development, and curricular support to make justifying and proving a routine part of middle school students' opportunities to learn.

**4. Conclusion**

Of the four indicators laid to measure the MRS, students lack most in use of pattern relationship to analyse situation, to make analogy, or to generalize. On the other hand, they most succeed in make conjecture and proof. Either successfulness or failure of the students in accomplishing the post-test was illustration of their work on SWS problems. Moreover, The ways support student's progress in achieving MRS are if (i) the problem faced is much mimicked the task solved in the classroom, (ii) more various problems given to solve under guidance, and (iii) intensive scaffolding is given.

**Acknowledgments**

This research was supported by the Ministry of Research, Technology and Higher Education of the Republic of Indonesia. The author is thankful to Rector of Universitas Negeri Medan, Research Director, and Dean of Faculty of Mathematics and Natural Sciences for providing necessary facilities to conduct the research.

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# A Comparative Study of Teaching Process of Presenting Product Sketch Design of Industrial Design Program

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Received: October 11, 2017      Accepted: October 30, 2017      Online Published: November 28, 2017  
doi:10.5539/ass.v13n12p174      URL: <https://doi.org/10.5539/ass.v13n12p174>

## Abstract

This research studies the teaching process of idea communication for industrial product design sketching. The objective of this research is to make a comparative study on the efficiency of two teaching processes between teaching with detailed information and teaching with conceptual frameworks for groups of students who have different learning aptitudes; which are an aptitude in theoretical subjects or an aptitude in practical subjects. The study also included differences in learning styles of the industrial design program undergraduate students. The researchers came up with an experiment of creating sketch design ideas for a product in which the researchers classified the students' learning processes from curriculum subjects and academic achievements. The results found that curriculum subjects and students' learning aptitude can be grouped into two major groups: students who have accumulated scores in theoretical subjects and students who have accumulated scores in practical subjects. These two groups of students have different aptitudes in sketch design idea communication processes: a process of sketching with given detailed information and a process of sketching with given conceptual framework. Although these are different processes, the teaching and learning of these two product design processes have the same objectives: to create design ideas and to support design creativity by using the concept of interaction between the brain, hands and shapes that appear on paper to present the sketch product and to guide the teaching and learning of industrial product design, suitable for students who have different characteristics and help increase their academic achievements.

**Keywords:** teaching process, sketch design, industrial design

## 1. Introduction

The teaching and learning of product design will develop the knowledge and skills of the students making creative designs. This requires integration of knowledge in science, technology and art by emphasizing creativity and the development of design concepts related to differences in outward appearance and with consideration for function, value, and appearance of the product, including form and size (Soodsang, 2005); in this way it is possible to create products that will maximize the benefit for both consumers and manufacturers. Sahachaisaeree (2004) states that designers usually work with forms and shapes. Though designers usually apply the "Elements of Design" and "Principles of Design" when creating a product, the experts will also apply strategies and skills which they have accumulated through interaction between brain, hands and shapes that appear on paper. (Laseau, 2001) calls this process "Graphic thinking" which is consistent with the Design development spiral of Zeisel. The process of Graphic thinking begins with the images that appear in the brain and are transferred via the hand onto paper; the brain then interacts with these basic ideas on paper through the eyes to further analyze and adjust; then the brain will apply more changes through the hand onto the paper. These processes will happen again and again until the designs are completed. The characteristics of the Design development spiral is that after completing the basic designs, the designers will alter the original ideas and develop them into the most suitable one (Sahachaisaeree, 2004; Zeisel, 1981). Thus, developing design skills is very important for analyzing products and developing creative idea solutions (Authority, 2013). In addition, conceptual design is an important element and factor that generates design creativity, new styles and uniqueness of products. Also, a systematical design concept will enable the designer to create products that follow the procedures of the teaching-learning process of product design and allows them to create products effectively.

Therefore, the teaching-learning process of product design must include practice drawing product sketches in order to present design ideas. Untrained students with different learning skills have to rely on techniques and an appropriate teaching process to be successful in their studies. In general, learning from experience (Experiential Learning Cycle Theory), Kolb (1984) explains that each student learns something new from experience which intends to encourage the student to use his/her acquired knowledge and to increase this knowledge and the ability to use the design skills; this can be done by providing the opportunity for students to have concrete experiences. The industrial design classes have teaching techniques that are different from other classes because it has a curriculum comprising both theoretical lectures and practical training for Design Projects. Students can find their own learning principles by making mistakes; as a result, each student would have different learning processes, perception and behaviours. In the past, teaching techniques usually were based on a teacher-centred approach, which is a technique in which the teacher organizes and

conducts most of the teaching activities. In other word, teachers would use the technique that they are familiar with and students would have a very little role in participating in activities. Therefore, the teacher-centred approach is more like a one-way communication which does not focus on different learning abilities of the students. This research aims to study the Design Idea Communication Process comparing teaching using detailed information and teaching using conceptual frameworks techniques. This research will focus on the different learning styles and techniques for industrial design students in order to classify these techniques from the curriculum subjects and the academic achievements of the students and to do a comparative study on different teaching processes for presenting product sketches. This is an interesting subject because if we understand the learning behavior of students in each group, we will be able to provide teaching-learning techniques that are suitable for the learning ability of students in each group. As a result, this could help increasing the academic achievement of students.

## 2. Research Conceptual Framework

Based on the introduction of a comparative study of teaching processes to present product sketch designs in the industrial design program, the researchers came up with a conceptual framework as a guide, see Figure 1.

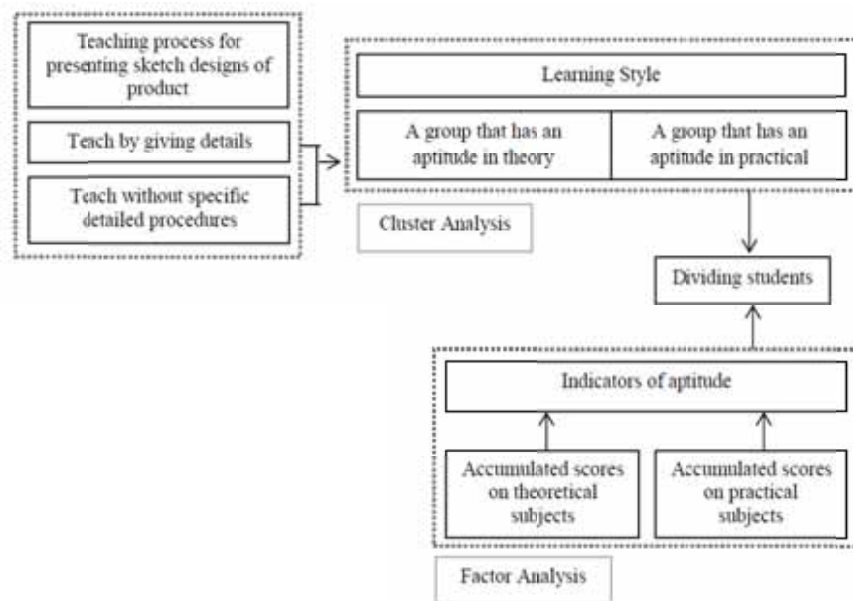


Figure 1. Conceptual framework

## 3. Method

In this research sample groups were selected by a non-probability sampling method; the members were all undergraduate students of the industrial design program at Rajamangala University of Technology, Phra Nakhon, Thailand. The researchers have conducted a comparative study of teaching processes to present product sketch design in the industrial design program in order to develop a set of indicators for evaluation and to create testing tools to evaluate the teaching-learning process of the industrial design program. The data collection method was divided into six steps as follows.

*3.1 Step 1* - We studied and collected transcript data of 4 classes of undergraduate students of the industrial design program. Three of these classes are now graduate students (totaling 124 students); the fourth class includes this year's students (totaling 65 students).

*3.2 Step 2* - The researches then proceeded reviewing students' grades in each subject to find the correlation of all variable pairs and a relationship between academic performance and courses taken in the curriculum.

*3.3 Step 3* - After calculating the correlation coefficients for each pair of variables in Step 2, in this step the factorial analysis method was used to divide the variable subjects into group variables to determine the groups of aptitude indicators. The study found two groups of aptitude indicators: a group with accumulated scores in theoretical subjects and a group with accumulated scores in practical subjects.

*3.4 Step 4* - Data was used from grade point performance of 65 students who are currently in their last year complying with the factor analysis, to divide students into groups by using cluster analysis in order to do an exploratory factor analysis of aptitude indicators groups. This yielded groups of variables in which variables in the same group are more related than variables from different groups; while variables from different group are less related or are not related at all.

*3.5 Step 5* - We conducted a test asking students to draw a sketch design. The test was divided into two sessions of 8 hours each. The first test session (Sketch Design 1) explained the steps and scoring criteria in full detail, while the

second test session (Sketch Design 2) did not provide detailed instruction and scoring criteria. Each test had a score of 100 points, the test details were as follows:

The first test session (Sketch Design 1) asked the students to draw sketch designs of a toaster onto A2 size paper following the process of design development; the scoring criteria are detailed in Table 1.

Table 1. Evaluation Procedures for Sketch Design Development

Evaluation Procedure	Points
Step 1 Problem Identification	10
- Problem Statement	5
- Troubleshooting	5
Step 2 Preliminary Ideas	5
Step 3 Design Refinement	10
Step 4 Analysis	20
- Function Analysis	5
- Engineering Analysis	5
- Specification Analysis	5
- Market and Product Analysis	5
Step 5 Decision	20
- Human Factors	5
- Strength	5
- Ergonomic	5
- Safety	5
Step 6 Implementation	35
- Design creativity	10
- Identification	5
- Aesthetic	10
- Element of Sketch Design	10
Total	100



Figure 2. Test session 1, students are asked to draw sketches design of a given product



Figure 3. Test session 2, students are asked to draw sketches design based on story and scenario

Test session 2 (Sketch Design 2): Students were asked to draw sketch designs of a product according to a given story or case scenario instead of being given exact product type. There were no given detailed procedures and scoring criteria, the students had to do the product analysis by themselves. In this case, the students were asked to draw a sketch design of a product to support making breakfast in David's family. David and his family live in Thailand; there are four family members including David, an American businessman aged 42; he has to rush to get to work on time after driving his son to school every morning. His Thai wife, aged 38, stays home to take care of the family. They have a son, aged 10 and a 1-year-old daughter. The students had to come up with a product design suitable for this family, and draw it onto A2 size paper (100 points).

3.6 Step 6 - Students had to submit their designs from both tests to 30 experts and professors involved in teaching product design from different universities, to evaluate the quality of their sketch designs. Then, the experts and professors made a result analysis conclusion and combined this with the results of cluster group analyses to see the difference in results coming from factor analysis used to group the curriculum subjects into theoretical subjects and practical subjects. Then, the experts and professors divided the students into two groups based on their scores from both product sketching tests. The first group was the group of students having an aptitude in theoretical subjects and a group of students having an aptitude in practical subjects. After that, the experts and professors answered the questions about the objectives of the research, specifically about teaching and learning styles.

#### 4. Results

##### 4.1 Correlation Coefficient between grade performance and subjects

From examining the academic performance of students in each subject, the relationship between the student's grade performance and the subjects are found by computing Pearson's correlation coefficient ( $r$ ) between each pair of subject variables and it shows a statistically significant relationship between each pair of variables, having a coefficient of correlation greater than 0.5; the details are shown in Table 2.

Table 2. Pearson Correlation Coefficient between grade performance and subjects.

Subject	Correlations	
History of Design	Pearson Correlation	.549
	Sig. (2-tailed)	.000**
Composition of Art	Pearson Correlation	.549
	Sig. (2-tailed)	.000**
Principles of Drafting	Pearson Correlation	.507
	Sig. (2-tailed)	.000**
Drawing Techniques	Pearson Correlation	.539
	Sig. (2-tailed)	.000**
Computer Technology	Pearson Correlation	.592
	Sig. (2-tailed)	.000**
Principles of Design	Pearson Correlation	.576
	Sig. (2-tailed)	.000**
Industrial Drafting	Pearson Correlation	.500
	Sig. (2-tailed)	.000**
Painting Techniques	Pearson Correlation	.572
	Sig. (2-tailed)	.000**
Ergonomics	Pearson Correlation	.576
	Sig. (2-tailed)	.000**
Model Making	Pearson Correlation	.592
	Sig. (2-tailed)	.000**
Workshop	Pearson Correlation	.556
	Sig. (2-tailed)	.000**
Cost and Price Analysis	Pearson Correlation	.548
	Sig. (2-tailed)	.000**
Industrial Product Design1	Pearson Correlation	.592
	Sig. (2-tailed)	.000**
Industrial Product Design2	Pearson Correlation	.556
	Sig. (2-tailed)	.000**
Industrial Product Design3	Pearson Correlation	.635
	Sig. (2-tailed)	.000**
Industrial Product Design4	Pearson Correlation	.567
	Sig. (2-tailed)	.000**
Industrial Product Design5	Pearson Correlation	.567
	Sig. (2-tailed)	.000**
Materials and Production	Pearson Correlation	.518
	Sig. (2-tailed)	.000**
Computer Aided Design1	Pearson Correlation	.590
	Sig. (2-tailed)	.000**
Computer Aided Design2	Pearson Correlation	.508
	Sig. (2-tailed)	.000**
Seminar	Pearson Correlation	.635
	Sig. (2-tailed)	.000**
Industrial Product Research	Pearson Correlation	.590
	Sig. (2-tailed)	.000**
Ceramic Design	Pearson Correlation	.538
	Sig. (2-tailed)	.000**
Graphic Design	Pearson Correlation	.500
	Sig. (2-tailed)	.000**

\*\* . Correlation is significant at the 0.01 level (2-tailed).

4.2 Factor analysis to determine the groups of aptitude indicators

The subject variables are grouped by Factor Analysis method to find groups of aptitude indicator factors. By using the academic achievement of 4 classes of industrial design students which included 3 classes of already graduated students, and students who currently are in their last year of the program, it is found that the factor loading is medium; as a result, it is unable to find Factor Indicator Variable. Thus, the researchers use the Equamax Rotation instead and find 2 main factor groups of theoretical subjects; there are 10 subjects in this group as follows: History of Design, Composition of Art, Drawing Techniques, Principles of Design, Principles of Drafting, Ergonomics, Seminar in Industrial Product Design, Industrial Product Research and Development, Materials and Production and Cost and Price Analysis, subjects that focus on theoretical and basic design, and a group of practical study subjects; there are 14 subjects in this group as follows: Industrial Drafting, Painting Techniques, Industrial Product Design 1-5, Model Making, Workshop, Computer Technology, Computer Aided Design and Manufacturing 1-2, Ceramic Design and Graphic Design, subjects that more focus on practical study than theory; the details are shown in Table3.

Table 3. Grouping the variables subjects by using Factor Analysis method

Subjects	Aptitude indicator factors	
	Theoretical subjects	Practical subjects
History of Design	.742	.252
Composition of Art	.757	.096
Drawing Techniques	.603	.417
Principles of Design	.706	.130
Principles of Drafting	.572	.338
Ergonomics	.572	.303
Seminar in Industrial Product Design	.592	.012
Industrial Product Research and Development	.606	.165
Materials and Production	.577	.225
Cost and Price Analysis	.582	.180
Industrial Drafting	.143	.542
Painting Techniques	.388	.572
Industrial Product Design 1	.158	.597
Industrial Product Design 2	.071	.573
Industrial Product Design 3	.052	.535
Industrial Product Design 4	.200	.587
Industrial Product Design 5	.270	.796
Model Making	.296	.581
Workshop	.136	.618
Computer Technology	.266	.547
Computer Aided Design and Manufacturing 1	.331	.565
Computer Aided Design and Manufacturing 2	.124	.517
Ceramic Design	.053	.640
Graphic Design	.132	.576

4.3 Exploratory factor analysis of students' aptitude

The following displays statistics data used to group the students by using Cluster Analysis to find the aptitude indicator factors; using the academic achievement of 65 students of the last year industrial design program and this should be consistent with factor analysis. From the analysis, it is found that 30 students are put into one group due to their accumulated scores in theoretical subjects and 35 students are put into another group due to their accumulated scores in practical subjects; the details are shown in Table 4.

Table 4. Grouping students based on their aptitude by using Cluster Analysis

Order of students	Aptitude indicator factors		Order of students	Aptitude indicator factors	
	Theoretical subjects	Practical subjects		Theoretical subjects	Practical subjects
1	0.248671	-0.54065	34	0.841689	-0.27741
2	0.205925	0.673306	35	0.128578	0.886047
3	0.836422	-1.02788	36	0.08967	-1.70081
4	0.609329	0.008269	37	1.22204	-0.73975
5	0.733625	-0.33013	38	0.822663	-2.41822
6	0.657702	0.208207	39	0.025847	-1.11792

7	0.259478	-1.79647	40	-2.0085	-2.85519
8	0.857075	-1.0805	41	-1.84759	-4.00937
9	0.167104	-0.84682	42	0.897067	-3.07237
10	0.380872	-1.23023	43	0.635235	-0.90404
11	0.157809	0.239769	44	-0.63329	-0.15434
12	0.325474	-1.67175	45	0.751639	0.772339
13	0.575998	0.116256	46	0.530648	-1.18713
14	0.515985	0.249676	47	1.160491	-2.13405
15	-0.08353	-0.16298	48	0.857994	0.513377
16	0.250531	0.222453	49	1.089357	-0.76911
17	0.634965	0.822956	50	-0.27865	-3.65483
18	1.157	-0.27819	51	-0.00273	-4.04598
19	1.191205	-1.14112	52	1.454544	0.660642
20	0.918297	0.473976	53	0.801982	0.918156
21	0.640038	-0.46795	54	1.004072	-0.61672
22	0.510861	-0.40358	55	0.735356	-0.63871
23	0.420357	-0.90734	56	-0.49732	0.205021
24	-1.8415	-1.2389	57	0.627335	0.164044
25	0.493202	-2.08729	58	1.422865	-0.65842
26	0.343656	-1.00818	59	-0.18303	-1.64284
27	1.095256	-1.25661	60	0.874389	0.74303
28	1.096936	-0.3077	61	0.857588	0.728852
29	0.257146	-1.34767	62	0.212006	-2.9305
30	-0.21077	1.029677	63	0.177405	0.349769
31	0.565304	0.630503	64	0.784662	1.671325
32	1.179343	0.431152	65	1.048526	-1.15582
33	0.776685	1.316716	Total	30 Students	35 Students

Table 5. The average score and the comparison between Sketch Design 1 and Sketch Design 2

Order of students	Sketch Design 1	Sketch Design 2	Paired Samples Test	
	<i>M(SD)</i>	<i>M(SD)</i>	<i>t</i>	<i>p</i>
4	75.33(5.16)	67.00(6.51)	2.90	0.034*
5	73.50(7.71)	64.50(5.89)	5.14	0.004*
6	73.33(2.07)	66.50(5.99)	3.52	0.017*
13	77.17(4.53)	72.17(2.48)	3.73	0.014*
14	69.67(8.57)	66.33(8.09)	4.15	0.009*
16	72.00(5.25)	64.33(6.50)	7.75	0.001*
18	73.83(4.26)	66.50(6.53)	5.50	0.003*
19	68.00(4.43)	60.84(6.37)	8.22	0.000*
20	68.33(2.42)	73.17(3.55)	-8.04	0.000*
21	75.33(3.44)	69.67(4.84)	6.17	0.002*
22	73.00(2.83)	68.17(3.55)	6.45	0.001*
24	74.17(3.25)	78.50(3.27)	-7.77	0.001*
28	86.17(4.07)	81.33(3.39)	5.80	0.002*
32	74.50(4.14)	69.67(2.88)	5.31	0.003*
34	69.33(3.20)	66.67(4.22)	4.34	0.007*
37	70.00(2.76)	64.83(3.66)	5.68	0.002*
44	71.17(4.54)	65.17(1.72)	3.72	0.014*
45	75.17(4.07)	70.17(2.52)	4.44	0.007*
47	71.50(3.33)	66.50(2.59)	3.95	0.011*
48	70.50(2.67)	65.83(3.06)	5.53	0.003*
49	79.33(1.63)	76.33(2.33)	2.05	0.095
52	73.17(3.97)	66.50(5.86)	4.15	0.009*
53	73.33(3.45)	78.50(3.45)	-5.68	0.002*
1	68.33(3.93)	60.00(4.34)	4.18	0.009*
2	64.67(1.51)	74.67(6.86)	-4.33	0.007*
3	62.33(6.74)	70.67(5.20)	-4.21	0.008*
7	69.00(8.99)	66.33(12.7)	1.13	0.310
8	70.50(6.38)	78.83(4.36)	-5.93	0.002*
9	65.33(5.81)	72.17(4.31)	-6.01	0.002*
10	62.00(5.37)	70.83(8.11)	-5.32	0.003*
11	63.83(7.83)	73.00(6.13)	-4.95	0.004*
12	66.83(5.27)	74.17(5.63)	-5.31	0.003*
15	68.00(3.35)	75.33(6.98)	-3.68	0.014*
17	74.33(8.96)	71.50(8.78)	0.94	0.392
23	68.67(4.03)	73.67(2.94)	-7.32	0.001*
25	62.50(3.02)	66.83(3.06)	-6.06	0.002*
26	62.83(3.66)	70.50(3.73)	-4.90	0.004*
27	64.17(4.26)	66.50(5.17)	-1.14	0.305
29	64.17(4.62)	68.83(2.04)	-4.08	0.010*
30	68.33(3.72)	71.33(3.45)	-2.91	0.034*
31	68.00(3.95)	73.00(3.52)	-4.84	0.005*
33	71.17(4.26)	76.33(3.01)	-4.23	0.008*
35	67.00(3.58)	72.83(4.31)	-5.41	0.003*
36	71.83(4.75)	68.33(3.98)	8.17	0.000*
38	66.83(3.65)	71.00(2.37)	-4.41	0.007*
39	74.00(2.53)	77.67(2.88)	-11.0	0.000*

54	75.83(4.26)	70.00(4.47)	5.26	0.003*
55	69.00(5.55)	73.50(5.09)	-6.71	0.001*
56	75.83(6.24)	67.50(4.14)	4.53	0.006*
57	75.17(3.43)	71.00(2.19)	5.26	0.003*
58	67.67(4.08)	72.67(3.33)	-5.84	0.002*
60	80.50(2.88)	76.33(2.42)	3.03	0.029*
61	79.00(3.74)	73.83(2.92)	3.27	0.022*

Note.

- Group of students that have high accumulated scores in theoretical subjects
- Group of students that have high accumulated scores in practical subjects
- The highest scores of both tests

40	65.00(3.29)	68.83(2.64)	-8.03	0.000*
41	66.00(3.57)	68.00(2.28)	-1.55	0.182
42	58.00(2.97)	62.50(3.39)	-20.1	0.000*
43	75.17(3.97)	80.67(4.27)	-2.91	0.034*
46	67.00(2.83)	74.00(4.34)	-4.65	0.006*
50	68.67(2.07)	65.00(3.22)	2.86	0.035*
51	58.33(1.97)	60.17(1.17)	-2.80	0.038*
59	72.67(3.88)	78.17(4.17)	-2.42	0.060
62	69.83(3.73)	75.17(4.45)	-4.54	0.006*
63	68.17(2.32)	74.33(4.84)	-4.07	0.010*
64	69.33(2.34)	72.50(1.87)	-2.53	0.050*
65	72.50(4.32)	77.83(3.66)	-5.06	0.004*

\*p<.05 is the level of significance

4.4 A test by making students draw a sketch design

In Test session 1 (Sketch Design 1), students are given details and scoring criteria and in Test session 2 (Sketch Design 2), students will not be given details and scoring criteria; both tests have a total score of 100. From testing 65 students of the current year industrial design program using both of the tests, the analysis results are as follows:

Comparing the mean scores of two different tests which are not independent, the analysis results found that 59 students performing the test in both sessions show statistically significant differences at the 0.05 level; except for six students at the order 7, 17, 27, 41, 49 and 59 showing no statistically significant differences.

The tests reveal that 25 out of 30 students or 83.33% of the group of students having high accumulated scores in theoretical subjects have an aptitude in Sketch Design 1, which gives detailed procedures and scoring criteria higher than Sketch Design 2; which gives no details and scoring criteria.

While there are 30 out of 35 students or 85.71% of the group of students having high accumulated scores in the practical subject that have an aptitude in Sketch Design2; which gives no details and scoring criteria.

In conclusion, the group of students with high accumulated scores in theoretical subjects are found to have an aptitude in Sketch Design 1, given detailed procedures and scoring criteria; while, the group of students that have high accumulated scores in practical subjects found to have an aptitude in Sketch Design 2 given no details and scoring criteria. There are 55 out of 65 students or 84.62% that met this criterion; the details are shown in Table 5.



Figure 4. Example of sketch designs from Sketch Design 1 and Sketch Design 2

4.5 Comparison between the two groups of students and two sketch designs

Differences were found between mean score, the comparison between two groups of students and two sketch design processes in which the two groups are not independent. The analysis results found that Sketch Design 1, Sketch Design 2 the group of students that have accumulated scores in theoretical subjects and the group of students that have accumulated score in practical subjects have the statistically significant differences at the 0.05 level; the details are shown in table 6.

Table 6. The mean score VS the comparison between the two groups of students and Sketch Design 1 and Sketch Design 2

	Group of Students with accumulated scores in theoretical subjects	Group of Students with accumulated scores in practical subjects	Independent Samples Test	
	M(SD)	M(SD)	t	p
Sketch Design 1	73.69 (4.10)	67.30(4.17)	6.215	0.000*
Sketch Design 2	68.92 (5.12)	71.47(5.01)	-2.029	0.047*

## 5. Discussion

Teaching processes have an impact on design idea communication processes: important elements and guidelines for the systematic designing process; it can also be used as a designing frameworks. Applying the information based on the conceptual ideas helps the designs to achieve the objectives. Each designer would have different design ideas, aptitude and design processes, the researchers found learning subjects and students' aptitude can be divided into two groups which are students that have accumulated scores in theoretical subjects and students that have accumulated scores in practical subjects. The group of students with accumulated scores in theoretical subjects would have an aptitude in the idea sketch design transferring processes that give detailed procedures and scoring criteria because this group of students would have systematical planning and work in detailed sequences. On the other hand, the group of students that have accumulated scores in practical subjects would have aptitude in idea sketch design transferring processes that are not given details and scoring criteria since this group of students like freedom of thinking and can learn from their mistakes and learn from the complicated situations, these students can analyze the stories and scenarios and turn into design ideas.

From these sketch design tests, it is found that although these two tests have different details and processes, they both support design creativity concepts. Also, they have to use the thinking process that derives from the brain, eyes and hands. The difference between these two processes affect learning and teaching industrial design (Sahachaisaeree, 2004). Also, the academic achievement of the students who have different aptitude indicators factor would have an impact on design idea transferring processes and skills in industrial design (Soodsang, 2005). In the present, students have many different conceptual design processes which may due to their former knowledge and access to knowledge in the form of criticism, knowledge synthesis and self-exploration, awareness of the difficulty and complexity of design, as well as the differences in individual which are differences in terms of learning styles, design ability and communication skills (Adi, 2015).

### Acknowledgments

The author would like to thank Assoc. Prof. Dr.NopadonSahachaisaeree and Asst. Prof. Dr.YaninRugwongwan, Faculty of Architecture, King Mongkut's Institute of Technology Ladkrabang, Thailand, for their kind suggestions, guidance, and support to the researcher. I also would like to thank Faculty of Architecture and Design, Rajamangala University of Technology Phra Nakhon, Thailand, for a scholarship to pursue my PhD course work and dissertation.

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# A Furniture Design Guideline Derived from the Socio-Economic Factors of Consumers for Their Choices of Sustainable Furniture Design in Thailand

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Received: October 12, 2017

Accepted: October 31, 2017

Online Published: November 28, 2017

doi:10.5539/ass.v13n12p182

URL: <https://doi.org/10.5539/ass.v13n12p182>

## Abstract

This article presents an environmentally friendly furniture design guideline which comes from different socio-economic conditions, including personality and physical residence of consumers in Thailand, and is a test for the perception of environmentally friendly furniture style, in order to find the style of environmentally friendly furniture in consumers with different economic backgrounds and perception of the environment. The research found that the needs for the style of environmentally friendly furniture according to different socio-economic conditions were in the same direction, which means that consumers need modern environmentally friendly furniture in western style, using natural materials in manufacturing with high technology, and furniture color in a cool shade. Therefore, the designer should consider the different socio-economic conditions of consumers that affect the needs differently, and use this as a furniture design guideline that is environmentally friendly and appropriate for the needs of consumers.

**Keywords:** Furniture Design, Sustainable Furniture Design, Consumers' Socio-Economic

## 1. Introduction

### 1.1 Introduce the Problem

At present, businesses cannot operate without considering the environment. Environmental activities and the Green market are applied in business strategy plans and considered top priority in terms of business planning (Durmaz & Yasar, 2016). Thailand has many environmental management policies. Focus on the solution to the manufacturer (Thailandindustry, 2009). For environmentally friendly products in Thailand, SME entrepreneurs in the consumer products business sector, such as Life style furniture, home decoration, containers, textile materials, and others, are encouraged to develop products for exporting into foreign markets so that the SME entrepreneurs can gain the knowledge of creative product design for the environment in the concept of Life Cycle Design, to reduce the impact on the environment systematically and reach maximum performance (Tcdc, 2017). In Thailand, the furniture industry is an industry that receives support and encouragement in terms of quality for the Thai market and exports (SMEs, 2014) but still lacks development in terms of new designs that are acceptable in both the Thai and World markets, and in terms of the use of materials and appropriate manufacturing processes, and the ability of blending materials for the manufacturing (Zhang & Zhang, 2012) of the furniture according to the popularity of each era, which are the overlapping problems in terms of technological capability, lack of skilled labor force, and having low manufacturing technology. Therefore, the design needs to be developed in order to have more efficacy.

Subsequently, Design for Environment (DfE) is used in the design process, which is very important for product design and is adjusted to be more enforcing for product management (Telenko, Seepersad, & Webber, 2008) and services in terms of the environment, especially in Northern Europe countries, Japan, and the United States that use it as product rules. Some companies have applied the concept in the design and product improvement process and this group of companies have become the highly competitive market leaders (Brezet & Hemel, 1997) who are able to design according to the green consumer and the market's needs. At present, emphasis has been placed on the Green market by which consumers can demand for the manufacturer to care for the environment. The importance of buying products and services that minimize environmental impact. Manufacturer and entrepreneur must pay attention to the green consumer. There are many factors that affect consumer buying behavior include demographics, self-concept, knowledge and values. The most influential factors are: demographic or the social-economic of consumers include gen, age, education, occupation and income (Consultants of Technology Co., 2556). The difference in the consumer's socio-economic background is a factor that can set the requirements in terms of furniture style that is appropriate and responds to the needs of consumers (Lewis, Gertsakis, Grant, Morelli, & Sweatman, 2001). This article points out the differences in the socio-economic factor, including the personality and physical residence of consumers in the context of Thailand that affects the needs for the style of the environmentally friendly furniture, so that the designer can use them as a guideline or policy and develop environmentally friendly furniture that responds to the needs in the consumer market and the furniture is less impact on the environment. (Brown, Hanson, Liverman, & Merideth Jr.,

1987)

**2. Theoretical Framework**

The research is based on the foundation of sustainability in the environment to be the guideline for sustainable consumption and manufacturing (Lewis, Gertsakis, Grant, Morelli, & Sweatman, 2001). The principle of this research is furniture design for the environment by focusing on the furniture’s design. The objective is to create a process and design guideline for sustainable products for manufacturers and users to be aware of when choosing to use and produce such products that will reduce environmental impact in the manufacturing process of furniture.

*2.1 Design for the Environment Relevant to Furniture*

The furniture industry is placing more importance on the environment by emphasizing the manufacturing process. The furniture industry for offices is an industry where both designers and factory managers are becoming more aware of the environmental impact caused by the manufacturing (Araji & Shakour, 2013). There are 2 significant elements of design that are relevant to furniture, which are the function and the objective of the design for the environment, by which the furniture must be able to be manufactured and used, and respond to market demand. The main principle of design for the environment must be considered throughout the life cycle of the products in all design processes to ensure that it can reduce environmental problems and lead to the elimination or reduction of the most severe environmental problems (Cole, Elliott, & Wu, 2008).

Table 1. The Principle of Environmentally Friendly Furniture Design

Issue	Description
<p>1. Material Selection</p> <p>Environmentally friendly materials should be selected. There are methods for recycling or consistent with disassembly to reduce the amount of material to a minimum with emphasis on function and for usability to remain and for the quality of the aesthetics or standards to be applied (Hayles, 2015), as follows:</p>	<ul style="list-style-type: none"> <li>- Contains recyclable materials.</li> <li>- Does not cause toxins or hazards.</li> <li>- From renewable sources.</li> <li>- Can be recycled easily.</li> <li>- Low power consumption.</li> <li>- Does not cause indoor air quality to be toxic or Sick building syndrome.</li> <li>- No ozone depletion.</li> <li>- Reduces a variety of material types and easy to recycle.</li> <li>- No potential color, texture, or visible object is obscured. Key points from using recycled materials.</li> <li>- Use sustainable managed forest materials.</li> </ul>
<p>2. Production</p> <p>Maximizing productivity and minimizing impact: (COLE, ELLIOTT, &amp; WU, 2008)</p>	<ul style="list-style-type: none"> <li>- Reduce the number of components and components.</li> <li>- Removal and reduction of gemstones. Minimal waste material.</li> <li>- Reduce the variety of material types.</li> <li>- Include functional functions together to reduce the hassle and number of components.</li> <li>- Use low impact materials and use clean production processes.</li> <li>- Avoid the use of adhesives that require solvent coatings and additives containing heavy metals.</li> </ul>
<p>3. Use</p> <p>Normally, usage has low environmental impact. However, the following should be considered:</p>	<ul style="list-style-type: none"> <li>- Pay attention to the materials and quality, feel, color, touch, surface design.</li> <li>- Innovative and a healthy work area that is good for the workplace.</li> <li>- Furniture must be easy to modify and durable.</li> <li>- Not obsolete and must be disposed of with no service life.</li> <li>- Most important is danger to human health, which involves the release of chemicals such as formaldehyde. Nitrogen dioxide Chlorofluorocarbons (CFCs) and volatile organic compounds (VOCs) are another form of air pollution (off-gassing), which affects health and affects the effectiveness of poor employee performance.</li> </ul>
<p>4. Avoiding waste and reusing resources.</p> <p>The problems that arise during production and disposal are disposal procedures or end of life. The remains of furniture are a major issue that results in the amount of furniture that needs to be buried or the coating and the decoration of heavy metal as a component. It causes contamination around landfills, and there is also the cost of energy and energy transfer from moving the furniture to the landfill, so reusable materials should be selected or sent through a new process. Durable material is easier to recycle (Hayles, 2015) and is a way to pull a product out of the waste cycle. The importance of the purpose of eco-economic</p>	<p><i>4.1 Design for durability can be increased by</i></p> <ul style="list-style-type: none"> <li>- Identifying and eliminating key weaknesses in the design, especially the parts for use.</li> <li>- The design must be compatible with normal conditions and misuse.</li> <li>- Can be easily repaired or serviced.</li> <li>- Product design should be upgraded. (upgradability)</li> </ul> <p><i>4.2 Design to disassemble</i></p> <p>Remember to make the material easy to separate into parts for recycling and reparable and upgradable to new ones.</p> <ul style="list-style-type: none"> <li>- The number of components that are the least fragmented.</li> <li>- Avoid glue. Use metal clamps and screws by method of push, hook, bolt snap fit (Click).</li> <li>- Tighten with materials that are compatible with parts. Connected Points and items easily accessible Removable hand</li> </ul> <p>- Block Design</p>

<p>design is a design for durability, design for disassembly, design for bruising and regeneration, design for recycling, and safe disposal design (Lewis, Gertsakis, Grant, Morelli, &amp; Sweatman, 2001)</p>	<ul style="list-style-type: none"> <li>-In-mold identification on resin parts to distinguish plastics (from ISO 11469 (ISO 2000)</li> <li>-the minimum material type.</li> <li>-Components that can't be recycled are easy to remove and dispose.</li> <li>-The highest priced parts are easily accessible.</li> <li>- Removing and assembling can be done with simple tools. This makes removing and assembling the smallest possible.</li> <li>-Parts get as standard as you can.</li> <li>-Fix in and fastener. Easy to separate pieces to avoid damage.</li> </ul> <p><i>4.3 Design for Reproduction and Reproduction</i></p> <p>The low environmental impact is mostly a reusable product, which must be considered, as well as the life cycle in the design process. The following should be done:</p> <ul style="list-style-type: none"> <li>- The product must be robust, resistant to service and service, transport, assembly and disassembly. Worth the repair.</li> </ul> <p><i>4.4 Design for Material Recycling</i></p> <p>A second product can be used.</p> <ul style="list-style-type: none"> <li>- Use the least amount of material types and only 2-3 types, although the volume is high because it can be recycled better than using 4-5 types, but less.</li> <li>-There should be a code or symbol that can identify the type of material.</li> <li>-When disassembled, should be separated to be same kind. Identify species for fast, safe, unmixed.</li> <li>-Avoid contamination of metal in plastic.</li> <li>-Avoid using laminate and composite materials.</li> <li>-Use a tensile strap to prevent contamination of cross-type materials.</li> <li>-Avoid using adhesive that is different from the material to be welded together to avoid contamination.</li> <li>-Choose duplicate materials at every stage of design as possible.</li> </ul> <p><i>4.5 Safe disposal design</i></p> <p>Observe label precautions for disposal. How to bind gas contaminants or identify toxic substances. Include contact information for safe disposal. The most important thing is not to use substances or ingredients that cause pollution problems.</p>
<p>5. System-wide issues</p> <p>Environmentally friendly products should be a unified where environmentally friendly products need an environmentally friendly system, in the following activities:</p>	<p><i>5.1 Integrated Care and Recovery</i></p> <p>Manufacturers must emphasize environmental policies and regulations. The current is more concentrated. The manufacturer must remove the product. At the end of its useful life, must be called back to eliminate. Responsibility is more than sales of showroom. Warranty and service agreement product stewardship and extended product responsibility for such a method is called "product take-back" (Chiu &amp; Chu, 2012).</p>

2.2 Research Questions and Hypotheses

According to the research objective, the significant research questions are; (a) How do consumers with different personalities have different needs in terms of the style of the environmentally friendly furniture? (b) How do consumers with different physical residence have different needs in terms of the style of the environmentally friendly furniture? The independent variables and dependent variables are shown in the below figure:

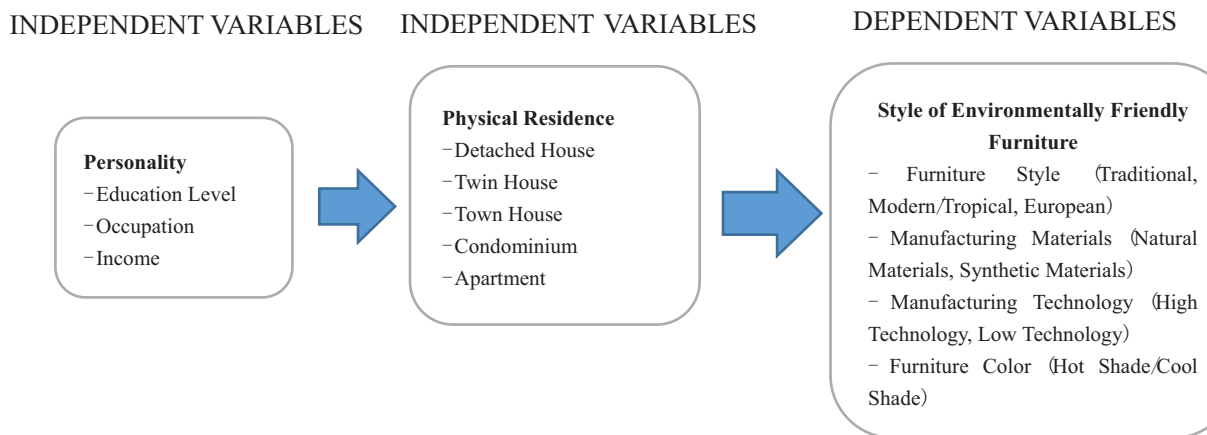


Figure 1. Research theoretical framework

The above figure shows the research hypothesis to find the cause of the rational between the independent variables and the dependent variables of the consumers. The independent variables are categorized into 2 groups as follows:

- 1) Personality Variables mean the attribution in terms of education level, occupation, and income since these 3 variables can indicate the characteristic of consumer’s socio-economic status.
- 2) Physical Residence Variables mean detached house, twin house, town house, condominium, and apartment. All these variables come from the consumer’s personality.

**3. Research Methodology**

*3.1 Research Procedures*

This research has divided the research procedures into 4 main steps as follows:

*Step 1:* Choose the sample of furniture that will be used as the sample for other furniture in the study by survey all seven brands of furniture in Thailand, the brand names are classified into different categories. According to the use of the Each room has its own furniture. Table type is in the type of furniture used in each room found that the sample chose the table furniture which was used as the sample of furniture in the research.

*Step 2:* Build the experimental instrument by simulating the style of furniture in the table furniture that is designed by using the principles of environmentally friendly furniture design in the categories of furniture style (traditional, modern / Tropical, European), manufacturing materials (natural materials, synthetic materials), furniture manufacturing technology (high technology, low technology), and furniture color (hot shade, cool shade).

*Step 3:* Test the perception of furniture simulation style that is designed to serve as the instrument to collect the questionnaire from the sample.

*Step 4:* Use the information from the questionnaire to do the statistical analysis to conclude the guideline of the needs for environmentally friendly furniture style of the sample that comes from different socio-economic conditions.

*3.2 Case selection*

Survey the furniture market in Bangkok. The furniture sold in the market is mainly used in the home. The furniture in the market is divided into two large groups of furniture in the home. And use outside. In this survey, we selected a company that sells furniture at the top level. Both domestic sales. Exports include imports. We have a wide range of products to choose from. We have 7 companies in our company. Winner mart group Co., Ltd, Modernform Group Co., Ltd., Podium Home center Co., Ltd., IKEA Thailand Co.Ltd., Used to survey the sample selection of this research. The researcher selects the group of furniture used in the house according to the characteristics of the use of furniture in five groups as follows. Furniture used in the bedroom, living room, dining room, kitchen, and office. Type of research sample The separation of furniture used in each room. The furniture in every room is a table, cabinet, but the research has limited time. Researchers chose table type furniture. This is used for the creation of research tools. To be appropriate for the time spent in research.

Company	Room	S.B. Furniture	Concept	Index	Winner	Modern form	Podium	IKEA	
Bed room	Bed	✓	✓	✓	✓	✓	✓	✓	
	Night table	✓	✓	✓	✓	✓	✓	✓	Cabinet
	Wardrop	✓	✓	✓	✓	✓	✓	✓	Table
	Desser	✓	✓	✓	✓	✓	✓	✓	
Living room	TV set	✓	✓	✓	✓	✓	✓	✓	
	Sofa	✓	✓	✓	✓	✓	✓	✓	
	Center table	✓	✓	✓	✓	✓	✓	✓	Table
	Side table	✓	✓	✓	✓	✓	✓	✓	Cabinet
Dining room	TV set	✓	✓	✓	✓	✓	✓	✓	
	Dining table	✓	✓	✓	✓	✓	✓	✓	
Kitchen room	Chair	✓	✓	✓	✓	✓	✓	✓	
	Kitchen	✓	✓	✓	✓	✓	✓	✓	
Working room	Desk	✓	✓	✓	✓	✓	✓	✓	Table
	Chair	✓	✓	✓	✓	✓	✓	✓	
	Cabinet	✓	✓	✓	✓	✓	✓	✓	Cabinet
	Book Shelf	✓	✓	✓	✓	✓	✓	✓	

Figure 2. How to choose a case study

*3.3 Area selection*



Figure 3. How to area selection for study

The sampling for this research was chosen from a sample with the power to make buying decisions and to choose the furniture, which is the working group in Bangkok Metropolitan Region without separating the sample that is needed to collect the questionnaire. For the selection of venue to collect the questionnaire, since the researcher needed a sample that can represent the whole sample, questionnaire data was collected from furniture showrooms in the Bangkok Metropolitan Region, which were set up as private showrooms, for a total of 7 brands. Then, showrooms were chosen in the downtown area so that questionnaires could be collected to cover the customers with residences that meet the demand, furniture is sold in the showroom, such as furniture made of natural materials. Synthetic materials There are a variety of styles of furniture. Which were the showrooms of Podium Home Center Company, which is located in the heart of the city and representing a showroom that can sell furniture.

3.3 Data Collection

3.3.1 Sampling Technique

The sample for the questionnaire collection by using a picture model of the environmentally friendly furniture in various types according to the categories of the design for the environment was a working group of 100 people, by using volunteering questionnaire collection without dividing the sample into who buys the furniture and who does not buy the furniture, in order to acquire information from both buyers and non-buyers, using the instrument which created a picture model to be used in the questionnaire and separating the collection of questionnaire by 2 people at a time, to be able to take care of all the respondents thoroughly. The time used for collecting each questionnaire was 30 minutes for 10 respondents per day, using a total of 10 days to collect all questionnaires until complete.

3.3.2 Research Methodology Tools

An illustrative questionnaire was used to model the environmental friendliness of the samples. It is comparable with 5 levels of popularity.

Like the left-hand side					equal	Like the right-hand side				
5	4	3	2	1	0	1	2	3	4	5

Like the left-hand side select in the 1-5 number field on the left-hand side.

Like the right-hand side select in the 1-5 number field on the right-hand side.

Like both pictures are equal. Choose the 0 number.











Table		Preference level.											
		5	4	3	2	1	0	1	2	3	4		5
1. Furniture style	Traditional 												Modern 
	Tropical 												European 
2. Material	Natural 												Synthesis 
3. The technology used in production.	High technology 												Low technology 
4. The color of the furniture.	Hot Shade 												Cool Shade 

Figure 4. Methodology Tools

4. Results

4.1 The Characteristic Analysis of the Socio-Economics of the Sample

Table 2. Percentage and Number of Occupations, Categorized by Education Level

Education Level	Occupation				Percentage (Total)
	Civil Service	Private Company	Self-Employed	Others	
High School	0	83.3 (5)	0	16.7 (1)	6.0 (6)
Diploma	29.4 (5)	58.8 (10)	11.8 (2)	0	17.0 (17)
Bachelor Degree	12.7 (7)	38.2 (21)	49.1 (27)	0	55.0 (55)
Master Degree	4.6 (2)	13.6 (3)	77.3 (17)	4.5 (1)	22.0 (22)
Percentage (Total)	14.0 (14)	39.0 (39)	46.0 (46)	1.0 (1)	100 (100)

C = 40.09 df = 9 Sig = .000

The personality of the sample had a maximum education level of bachelor degree, followed by master degree, diploma, and a minimum of high school. When analyzing occupation and education (Table 2), it is found that self-employment is the highest in master degree and bachelor degree holders, followed by employees in private company, which shows that those who have a high education level will choose to be self-employed to relatively high degree. The test results by using Chi-square found that education level and occupation had a relationship at average levels with a confidence level of 0.01 within statistical significance.

4.2 The Income and Type of Residence Analysis of the Sample

For the socio-economic analysis of the sample, because the consumption of each individual depends on the income as the main factor by which income can clearly indicate the socio-economic condition of the sample, when testing the income with the selection of residence of the sample, it can be seen that the type of residence depends on the income of the sample. The type of residence is the determiner for the environmentally friendly furniture style of the sample. The income and type of residence are interrelated. According to the study of 100 samples, it is found that the samples who reside in a town house have the highest average income of 32,925 baht per month, followed by detached house with an average income of 32,487 baht per month, and apartment with the lowest average income of 15,250 baht per month. Detached house, twin house, and town house are the types of residences that have a high price. Therefore, the sample who resides in these residences will have high income with a confidence level of 0.01 within statistical significance.

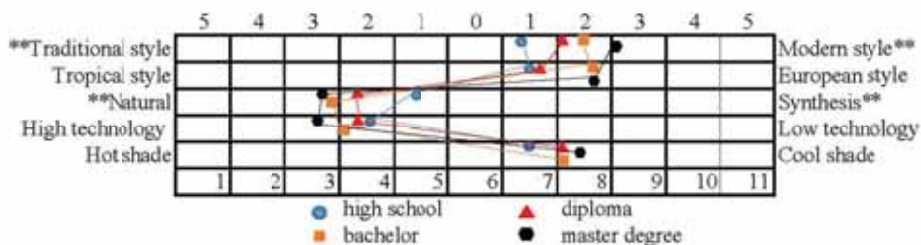
Table 3. Average Income per Month, Categorized from the Type of Residence of the Sample

Average Income	Type of Residence					Average
	Detached House	Twin House	Town House	Condominium	Apartment	
Average Income per Month	32,487 Baht	27,571 Baht	32,925 Baht	23,562 Baht	15,250 Baht	29,800 Baht

F = 8.998 df = 4 Sig = .000

4.3 Education Level Analysis and Demand for Environmentally Friendly Furniture Design of the Sample

The environmentally friendly furniture design analysis of the sample and corresponding to the socio-economics of the sample with different education by comparing mean and testing the relationship by using Linear Regression found that all education level groups tend to have demands for environmentally friendly furniture design in the same direction. However, the master degree group had a distinctly higher demand for modern furniture style than other education groups, and were also able to describe the demand in various aspects of the sample with a confidence level of 95% within statistical significance as shown in Figure 5.



\*\* Significance Level of 0.01

\* Significance Level of 0.05

Figure 5. The demand for environmentally friendly furniture of the sample with different education levels

Table 4. The Relationship of Education Level with Demand for Environmentally Friendly Furniture Style of the Sample

Dependent Variable	Independent variables	r.	r <sup>2</sup>	B (Beta)	P (Sig.)
Furniture style Traditional / Modern	Education	.482 <sup>a</sup>	.224	.397	.000
Material Natural / synthesis	Education	.601 <sup>b</sup>	.348	-.369	.006

4.4 Occupation Analysis and Demand for Environmentally Friendly Furniture Style of the Sample

Occupation is very important at present because it can indicate the expertise of a person in many aspects. Occupation also can generate income and indicate the socio-economic background of the sample. According to the study of demand for furniture style of the sample with different occupations, which were civil service, employees in private company, self-employed, and others, by using Compare mean and testing the relationship by using Linear Regression, it was found that occupation was able to describe the relationship of the demand for environmentally friendly furniture style in Tropical and European style for only one category (Table 5), but the demand in other categories were in the same direction as shown in Figure 6.

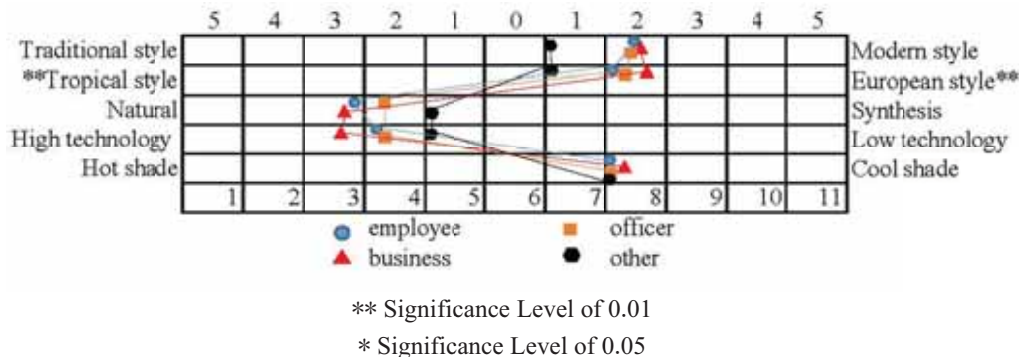


Figure 6. Relationship of Occupation and Demand for Environmentally Friendly Furniture Style of the Sample  
 Table 5. Relationship of Occupation and Demand for Environmentally Friendly Furniture Style of the Sample

Dependent Variable	Independent variables	r.	r <sup>2</sup>	B (Beta)	P (Sig.)
Furniture style Tropical / European	Occupation	.261 <sup>a</sup>	.058	.261	.009

4.5 The Analysis of Income and Demand for Environmentally Friendly Furniture Style of the Sample

The consumption of the sample depends on many factors by which income is the main factor of the socio-economic backgrounds of the sample. Those with high income will have an opportunity to buy high-quality products. From 100 samples, the income can be categorized into 3 groups and relationships were found by using Linear Regression. It was found that income is related to the demand for environmentally friendly furniture design in the same direction, except for the category of manufacturing materials and manufacturing technology. Income was able to describe the demand for the furniture style with a confidence level of 95% within statistical significance as shown in Table 6.

Table 6. Relationship of Income and Demand for Environmentally Friendly Furniture Style of the Sample

Dependent Variable	Independent variables	r.	r <sup>2</sup>	B (Beta)	P (Sig.)
Material Natural / synthesis	Income	.419 <sup>a</sup>	.168	-.263	.000 <sup>a</sup>
Technology in process High technology / Low technology	Income	.460 <sup>b</sup>	.195	-.245	.000 <sup>b</sup>

4.6 The Analysis of Physical Residence and Demand for Environmentally Furniture Style of the Sample

Physical residence is one of the factors that indicates the demand for environmentally friendly furniture style of the sample since residence is a result of the socio-economic background of the sample. Therefore, different residences have different demands for environmentally friendly furniture style. The environmentally friendly furniture style can be analyzed from the types of residence, which are categorized into detached house, town house, condominium, apartment, and twin house by using compare mean and testing the relationship by using Linear Regression. It is found that the types of residence was able to describe the demand for traditional style and modern style and manufacturing materials for environmentally friendly furniture of the sample in the same direction as shown in Figure 7.

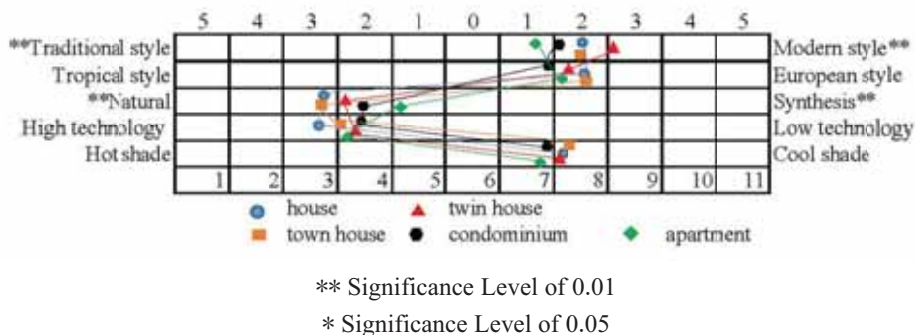


Figure 7. The Demand for Environmentally Friendly Furniture Style of the Sample with Different Residence  
 Table 7. The Analysis Results of the Types of Residence and Demand for Environmentally Friendly Furniture Style of the Sample

Dependent Variable	Independent variables	r.	r <sup>2</sup>	B (Beta)	P (Sig.)
Furniture style Traditional / Modern	House	.277 <sup>a</sup>	.068	-.232	.005 <sup>a</sup>
Material Natural / synthesis	House	.337 <sup>a</sup>	.095	.197	.003 <sup>a</sup>

It can be seen that the relationship of each independent variable is related with the demand for furniture style, materials, and the technology in the manufacturing in each relationship. Therefore, the furniture manufacturing materials and the manufacturing technology is important for the environmentally friendly furniture design guideline.

## 5. Discussion and Recommendations

An environmentally friendly design that responds to the demands of the consumer's furniture style is a key principle for designers and furniture entrepreneurs that will determine good sales performance. The characteristics of the socio-economic background of the target group sets the demands for the furniture style in which those who have the potential to buy and make a decision are satisfied with the environmentally friendly furniture style.

### 5.1 Environmentally Friendly Furniture Design Guideline with the Demand of the Target Group for Designers to use as a Design Guideline

1) Environmentally friendly furniture design in modern style more than traditional style and western style over eastern style, which is popular with current times. Furniture that is modern and emphasizes style more. The types of residences are modern and western style and so residential projects have increasingly followed this same design. Designers should consider the overall habitat of the target audience or target audience. Before designing furniture to achieve the style of furniture that is environmentally friendly to meet the needs of the target.

2) For the manufacturing materials, the target group has the demand for environmentally friendly furniture that uses natural materials in the manufacturing since domestic manufacturers turn to using more natural materials in the manufacturing, such as rubber wood and rattan. Environmentally friendly furniture that is made from natural materials provides liveliness for the residents. The designer selects materials for production. It should be natural materials from the forest. With sustainable management Avoid toxic materials with toxic substances. Especially attention to reducing the use of urea formaldehyde. Recycled materials can be recycled after use.

3) For the manufacturing technology, the target group has the demand for environmentally friendly furniture that uses high technology in the manufacturing. Which is essential for the production of furniture. Technology and machinery should be maintained so that quality and efficient furniture can be produced. Reduce energy consumption And reduce the waste of parts. Entrepreneurs have brought machinery in the manufacturing to produce higher amount of furniture in the industry so that the price of environmentally friendly furniture is not too high and lifespan of the furniture is able to be determined.

4) For the environmentally friendly furniture's color, the target group has the demand for the furniture to have a cool shade since the target group sees that it provides a comfortable feeling for the user and the residents. Designers need to focus on the use of non-toxic paint and surfaces that release chemicals into the atmosphere.

### 5.2 Recommendations

#### 5.2.1 Recommendation for applying research results

From the study of the differentiation of the sample with socio-economic conditions as the key variable but uncontrollable, the design for the environmentally friendly furniture to meet the market demands is relatively difficult. Therefore, the designer must design environmentally friendly furniture according to the selling demands more than designing furniture for all groups. The socio-economic status of the sample is the income of the sample. It determines the residence and life style.

#### 5.2.2 Recommendations for further research

In this research, there might be some things that can benefit the design but still with some limitations. Therefore, the researcher provides suggestions to focus on to make the study more complete.

For further research, there should be a reliability test for the instrument before actual use.

This research cannot do the experiment for all rooms and all types of furniture since the furniture model might be unpractical and there are many types of furniture in the house. Therefore, further research should research all types of furniture to be more complete.

This research is a study for the demand of environmentally friendly furniture style by using illustrations.

However, in reality, the illustrations cannot make the sample envision other furniture environments. Therefore, the illustrations should be controlled to cover more furniture.

## Acknowledgements

The author would like to thank Assoc. Prof. Dr. Nopadon Sahachaisaeree and Asst. Prof. Dr. Yanin Rugwongwan, Faculty of Architecture, King Mongkut's Institute of Technology Ladkrabang, Thailand, and Dr. Wichitra Singhirunnusorn for their kind suggestions, guidance, and support to the researcher.

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# The Impact of Microeconomic Variables on Stock Return by Moderating of Money Supply

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Received: October 22, 2017

Accepted: October 31, 2017

Online Published: November 28, 2017

doi:10.5539/ass.v13n12p191

URL: <https://doi.org/10.5539/ass.v13n12p191>

## Abstract

The purpose of this study is to empirically investigate the effect of microeconomic variables on stock return with moderating role of money supply (MS). The selected microeconomic variables in this study are debt-to-equity ratio (DE), dividend per share (DPS), and quick ratio (QR). Firm size and book-to-market value are considered as controlling variables. The period of the study is from 2003 to 2012 and the sample population of this study is 300 companies listed on Kuala Lumpur Stock Exchange (KLSE). Secondary data were collected from DataStream International, financial annual reports, and the World Bank databank. Generalized least squares (GLS) technique was used to estimate the predictive regressions in form of multiple models of panel data sets. According to the findings, MS moderates the impact of DE and QR on stock return, but does not moderate the effect of DPS on stock return. Besides, MS moderates the impact of all selected predictors on stock return. The findings of this study further show that an increase in value of a firm's debt relative to its equity would cause a decrease in the firm's stock return. The results also indicate that firms with higher QR and DPS are likely to have a higher stock return. Overall, the findings of this research are consistent with Modigliani and Miller's capital structure theory, as well as Pecking Order and Bird In Hand theory. The findings of this study would be of interest to domestic and international investors, stockbrokers, board of directors, financial managers, and policy makers.

**Keywords:** macroeconomic variables, microeconomic variables, money supply, stock return

## 1. Introduction

According to Chung and Ariff (2016) and Urbanovský (2016), Friedman's proposition that "money supply increases should lead to liquidity surges-to credit expansion" has yet received unanimous empirical support. Friedman (1968) stated that gradual increase in money supply is necessary for a healthy economy as it stimulates the economic expansion. Therefore, as stock market growth reflects economic expansion, money supply might be influencing stock market directly or/and through moderating the effect of microeconomic variables on stock market. Moreover, (Singh, Mehta, & Varsha, 2011) pointed out that investors have a better chance of developing profitable investment strategies if they include macroeconomic variables in their decision making. Therefore, including the macroeconomic variables in analyzing the predictability of stock return might lead to more accurate results. Besides, Idris and Bala (2015) specified that so far, there is no consensus as to which single or combination of variables best explains stock market returns. This introduces a gap of knowledge to be filled by researchers through including other variables and/or moderators as well as control for country and economic condition.

Some characteristics in developed countries have shown a strong ability in forecasting stock returns. According to Idris and Bala (2015), the degree of explanatory power of variable(s) on stock market returns might depend on the country and period of study. The impact of macroeconomic variables on the stock market has been empirically proven for the developed countries. Nonetheless, the empirical findings for the case of developing economies is still a puzzle. Hence changes in the share prices are affected by the changes in macroeconomic performance in the well-developed markets, but results are inconclusive for the emerging markets (Rahman, Sidek, & Tafri, 2009).

Emerging markets, as mentioned by Cohen (2002), have, on average, higher stock return than developed countries, which consist of the European Union, Japan, and the United States. Based on another study conducted by Lim (2009), there is rapid growth and low correlations between emerging markets in the South-East Asian regions, which offers lower portfolio risk and higher return for international investors. These make their stock markets interesting for both domestic and international investors seeking new opportunities to diversify their portfolio. Moreover, another study conducted by (Auzairy, Ahmad, & Ho, 2011) stated that investors have paid more attention to ASEAN-5, especially Malaysia and Singapore, in the last three decades.

The Malaysian stock market is of special interest as it shows a different pattern of stock price movement either from the developed or other emerging economies (Rahman et al., 2009). The Malaysian stock market offers high return investment opportunities while it has yet to be studied. Therefore, this research is focusing on the stock market of

Malaysia.

In conclusion, this study examines the impact of the 3 selected microeconomic variables on the stock return in Malaysia and investigates the moderating impact of money supply as a macroeconomic variable on this relationship. Thus, the findings of this research help in filling the gap in the literature regarding the determinants of stock return.

## 2. Literature Review and Hypothesis Development

Stock return is defined as the capital gain or loss as a result of investing in the stock market (Jones, 2000). Stock return is received through trading in the secondary market in the form of capital gain (changes in stock price) and dividends (Hällfors, 2013). Stock price is determined by demand and supply, which is usually influenced by firm characteristics and/or macroeconomic variables (Akinlesi, 2011). Therefore, this study examines the effect of both micro and macroeconomic variables on stock return.

### 2.1 Microeconomic Variables

Research on microeconomic variables and their effect on stock return in developed countries have been adequately documented. However, the impact of microeconomic variables on stock return in developing countries including Malaysia are comparatively limited and show contradicting results.

Based on the signalling theory, investors view debt as a signal of firm value and firms with high anticipated profits will take on high level of debt. Moreover, Modigliani and Miller's tradeoff theory of leverage suggests that stock price increases with leverage. The pecking order theory, however, which has been empirically observed to be the most used in determining companies' capital structure, suggests that profitable firms use less debt. Prior research on these theories have reached contradictory results. Titman and Wessels (1988), Rajan and Zingales (1995), (Hall, Hutchinson, & Michaelas, 2000) and Fama and French (2002) found that the most profitable firms more likely borrow less. These results are consistent with the pecking-order theory. However, Hovakimian et al., (2001), Korajczyk and Levy (2003), Hovakimian (2004), Hovakimian and Tehranian (2004), Frank and Goyal (2003), and Idris and Bala (2015) supported the trade-off theory and found a positive relationship between debt-to-equity ratio and stock returns. These contradictory results could be because of different economic conditions (according to Modigliani and Miller's capital structure theory) or maybe due to the period or scope of study or lack of mediating or moderating variables. Therefore, debt-to-equity ratio is selected as one of the microeconomic variables in this study.

The dividend irrelevance theory by Modigliani and Miller essentially indicates that an issuance of dividends should have little to no effect on stock return. However, bird-in-hand theory which was developed by Myron Gordon and John Lintner contradicts the Modigliani and Miller dividend irrelevance theory. Bird-in-hand theory indicates that investors care whether their returns are from dividends or capital gains. Based on the bird-in-hand theory, shares with high dividend payouts have higher demand by investors and consequently command a higher market price. Hartono (2004) found that dividend per share negatively influence stock return. Conversely, Docking and Koch (2005), (Kothari, Lewellen, & Warner, 2006), and Al-Shubiri (2010), found a direct relationship between dividend per share and stock return. Therefore, in order to help resolving the existing contradictory findings, this study examines the impact of dividend per share on stock return.

Quick ratio (QR) has been selected in this study as an indicator of a company's short-term liquidity. Liquidity of company describes the company's ability to meet its short-term liabilities. In the current unstable economy in Malaysia, the ability of companies to pay their debt is among the highest concerns of investors. The analysis of short-term liquidity is often important as it gives confidence to investors about a company's ability of short-term success in paying debts (Subramanyam & Wild, 2009). QR is more conservative than current ratio because it eliminates the inventories from the current assets. Converting inventories into cash takes time and if the inventories must be sold quickly, the company must accept a lower price than their book value. Therefore, they are excluded from assets which are ready sources of immediate cash. Previous research found contradicting results on the influence of QR on stock return. Ulupui (2007), (Chang, Faff, & Hwang, 2010), Saleem and Rehman (2011) and (Shadkam Aga, Mogaddam, & Samadiyan, 2013) found a positive impact of QR on stock return while Stefano (2015), Hernendiastoro (2005), and Komala and Nugroho (2013) found no impact of current ratio on stock return. Therefore, this study examines the impact of QR on stock return in order to add to the body of literatures and help resolving the contradictory findings.

The following hypotheses were developed based on the above discussion.

H1: Microeconomic variables have a significant impact on stock return

H1a: D/E has a significant negative impact on stock return

H1b: DPS has a significant positive impact on stock return

H1c: Quick ratio has a significant positive impact on stock return

### 2.2 Money Supply

Monetary Portfolio Theory suggests that changes in money supply alter the equilibrium position of money, thereby altering the composition and price of assets in an investor's portfolio (Rozeff, Rozeff, & Kinney, 1976). In addition, changes in money supply may impact on real economic variables, thereby having a lagged influence on stock returns (Rogalski & Vinso, 1977). Both of these mechanisms suggest a positive relationship between changes in money supply

and stock returns (Bilson, Brailsford, & Hooper, 2001). According to a conventional economic theory by Fama (1981), an increase in money supply leads to an increase in discount rates, which in turn lowers the price of stock, and thus, confers a negative effect. However, Mukherjee and Naka (1995) argued that if an increase in money supply leads to economic expansion via increased cash flows, stock prices would benefit from economic growth led by such an expansionary monetary policy. Maysami and Koh (2000) showed that money supply is positively related to stock market in the cases of Singapore and Japan. Their findings support the view of Mukherjee and Naka (1995) regarding long run and short run dynamic interaction between money supply and stock returns (Rahman et al., 2009). (Brunie, Hamburger, & Kochin, 1972), (Blume, Kraft, J., & Kraft, A., 1977), and Hasan and Javed (2009) found a strong linkage between money supply and stock return. However, Cooper (1974) and Hashemzadeh and Taylor (1988) found that there is no significant link between the two variables. In the Malaysian context, Ibrahim and Aziz (2003) studied causal relations and dynamic linkages between the Malaysian stock market and four macroeconomic variables, including exchange rate, money supply, industrial product, and CPI. They found dynamic responses of the stock prices to changes in macroeconomic variables. Lagged responses of stock price in their study to real economic activity means inefficiency in the Malaysian equity market. Although based on their findings, the role of money supply in the dynamic behavior of equity prices seemed to decline over time, periodically, its relationship to equity prices was uncertain and, in the long run, was negative. This means that shocks in money supply may feed into the economy's inflation instability, expectations of contractions, and risk elements. Accordingly, this results in adverse or uncertain behavior of the stock market. (Rahman et al, 2009)

According to the above studies, since money supply affects discount rate and liquidity, it might influence the impact of D/E, DPS, and QR on firm performance and stock return. This is because the influence of the selected microeconomic variables on stock return depends on discount rate and liquidity. Therefore, this study examines the moderating impact of money supply on the relationship between the three selected microeconomic variables and stock return. Accordingly, the following hypotheses were developed.

H2: Money supply moderates the impact of microeconomic variables on stock return

H2a: Money supply moderates the impact of D/E on stock return

H2b: Money supply moderates the impact of DPS on stock return

H2c: Money supply moderates the impact of Quick ratio on stock return

### 3. Research Method

#### 3.1 Sample and Data Selection

All firms listed in the Kuala Lumpur Stock Exchange (KLSE or Bursa Malaysia) were the subjects of this research. According to the Bursa Malaysia annual reports, the total number of listed companies in 2003 was 906 (the base year of study period). The sample population of this study is 300 companies listed in KLSE. The sampling method used in this study is convenient random sampling, as the 300 companies were selected randomly out of 342 with available data from Datastream International. The study examines a sample period of 2003 to 2012 and studies the effect of experimental variables and the moderator on stock return of subsequent years because stock return might lag behind the economic activities (Kwon & Shin, 1999). This study has used secondary data collected from three main sources of DataStream International, financial annual reports, and the World Bank databank. The two sources used to collect data pertaining to microeconomic variables and stock return were DataStream and financial annual reports. The source used for macroeconomic data was the World Bank databank.

#### 3.2 Variables Measurement

##### 3.2.1 Debt to Equity (D/E)

The debt-to-equity ratio (D/E) is a financial ratio indicating the relative proportion of shareholders' equity and debt used to finance a company's assets (Peterson & Fabozzi, 1999).

D/E is defined as a measure of a company's financial leverage. D/E is also known as gearing, leverage or risk ratio. D/E is calculated as follow:

$$D/E = \text{Total Liabilities} / \text{Average shareholders' equity} \quad (1)$$

Total liabilities is the sum of both short term and long-term liabilities, while average shareholders' equity is the mean value of stockholders' equity of two consecutive fiscal years. Changes in D/E ratio can potentially affect stock return of companies because of changes in cost of debt and risk of bankruptcy. High amount of D/E ratio of a company shows that the firm has been aggressive in financing its growth by using debt rather than equity or internal financing. This might result in lower stock return because of higher cost of debt. Conversely, a smaller amount of debt to equity ratio may benefit shareholders as earnings would be spread among them rather than being paid as interest. Besides, the cost of debt will be lower as well as bankruptcy cost which results in higher demand for the stock and potentially higher return.

##### 3.2.2 Dividend per Share (DPS)

The dividend yield or dividend-price ratio of a share is the dividend per share divided by the price per share (Cohen, 2002).

DPS is calculated as follow:

$$DPS = (D - SD)/S \quad (2)$$

Where D is the sum of dividends over a period (1 year), SD is the special (one-time) dividends, and S is the shares outstanding for the period. Based on bird-in-hand theory, DPS can influence stock return as the demand for shares with high DPS is potentially higher than the other shares. Bird-in-hand theory indicates that investors are indifferent to whether their returns from holding a stock arise from dividends or capital gains. According to this theory, shares with high dividend payouts have higher demand by investors and consequently command a higher market price.

### 3.2.3 Quick Ratio (QR)

Quick ratio measures the ability of a company to use its near cash or quick assets to immediately extinguish or retire its current liabilities. Quick assets include those current assets that can be quickly converted to cash at a price close to their book values. Unlike current ratio, inventory is excluded from the sum of assets in the quick ratio (Tracy & Tracy, 2004). In other words, quick ratio is a measure of how well a company can meet its short-term financial liabilities. QR also known as the acid-test ratio, is calculated as follow:

$$QR = (Cash + Marketable Securities + Accounts Receivable)/(Current Liabilities) \quad (3)$$

Quick ratio is a more conservative version of current ratio. Although the two are similar, the quick ratio provides a more rigorous assessment of a company's ability to pay its current liabilities. It does this by eliminating all but the most liquid of current assets from consideration. Inventory is the most notable exclusion, and it is not included in quick ratio because it is not as rapidly convertible to cash and is often sold on credit.

### 3.2.4 Money Supply

Money supply (or money stock) is the total amount of monetary assets available in an economy at a specific time. There are several ways to define money but standard measures usually include currency in circulation and demand deposits (DeFusco, Johnson, & Zorn, 1990). Money supply includes safe assets, such as cash, coins, and balances held in checking and savings accounts that businesses and individuals can use to make payments or hold as short-term investments.

The different types of money in the money supply are classified as M0, M1, M2, and M3 based to the type and the size of the account in which the instrument is kept. M0 and M1 are called narrow money as well, and include notes and coins that are in circulation and other money equivalents that can be converted easily to cash. M2 includes M1, short-term deposits in banks and certain money market funds. M3 includes M2 in addition to long-term deposits but it is no longer included in the reporting by the Federal Reserve. M0 (MZM), or money zero maturity, is a measure that includes financial assets with zero maturity and that are immediately redeemable at par. In this research similar to related studies such as Vejzagic and Zarafat (2013), broad money (M2) is selected as representative of money supply.

### 3.2.5 Stock Return

Stock return is defined as the capital gain or loss as a result of investing in the stock market (Jones, 2000). Stock return is received through trading in the secondary market in the form of capital gains (changes in stock price) and dividends (Hällefors, 2013).

Stock return is the dependent variable in this research and it's measured by calculating return index (RI), which shows the growth in value of a share over a specified period of time. According to DataStream International, RI is calculated as follow:

$$RI_t = RI_{t-1} * \frac{PI_t}{PI_{t-1}} * \left(1 + \frac{DY_t}{100} * \frac{1}{N}\right) \quad (4)$$

Where:  $RI_t$  is return index on day t;  $RI_{t-1}$  is return index on previous day;  $PI_t$  is price index on day t;  $PI_{t-1}$  is price index on previous day;  $DY_t$  is dividend yield % on day t; N is number of working days in the year (taken to be 260).

### 3.2.6 Total Assets

In financial accounting, an asset is an economic resource. Anything tangible or intangible that can be owned or controlled to produce value and that is held by a company to produce positive economic value is an asset. Simply stated, assets represent value of ownership that can be converted into cash (although cash itself is also considered an asset) (Sullivan, 2003).

Total assets is the sum of all current and non-current assets and equals to the sum of total liabilities and stockholders' equity. Total assets is calculated as follow:

$$Total Assets = liabilities + stockholders' equity \quad (5)$$

As similar studies by Fama and French (1993) and (Kouser et al., 2011) this research is considering total assets as a proxy of firm size.

### 3.2.7 Book to Market Ratio

The book-to-market ratio is a ratio used to find the value of a company by comparing book value of a firm to its

market value. The book value is calculated by looking at the firm's historical cost, or accounting value, while market value is determined in the stock market through its market capitalization. Book to market ratio is calculated as follow:

$$Book\ to\ Market\ Ratio = (Book\ value\ of\ firm) / (Market\ value\ of\ firm) \tag{6}$$

The book-to-market ratio attempts to identify undervalued or overvalued securities. In basic terms, if the ratio is above 1, the stock is undervalued and if it is less than 1, the stock is overvalued. This financial ratio has been considered in this current study, as it is one of the main common risk factors in the returns on stocks (Fama & French, 1993).

### 3.3 Regression Models

As similar studies (Frazier, Tix, & Barron, 2004) three steps of applying a hierarchical multiple regression were employed to investigate the moderating impact of money supply.

Step 1: the impact of predictor variables on dependent variable (Model 1):

$$SR_{i,t+1} = \alpha_0 + \beta_1 DE_{i,t} + \beta_2 DPS_{i,t} + \beta_3 QR_{i,t} + \varepsilon_{i,t} \tag{7}$$

Where  $SR_{i,t+1}$  is logarithm of stock return index of company i in year t+1;  $DE_{i,t}$  is debt to equity ratio of company i in year t;  $DPS_{i,t}$  is Dividend per shar of company i in year t;  $QR_{i,t}$  is quick ratio of company i in year t;  $\alpha_0$  is constant. The disturbance term denoted as  $\varepsilon_{i,t}$  was assumed to be serially uncorrelated with mean zero.

Step 2: the impact of moderator variable on dependent variable (Model 2):

$$SR_{i,t+1} = \alpha_0 + \beta_1 DE_{i,t} + \beta_2 DPS_{i,t} + \beta_3 QR_{i,t} + \beta_4 MS_t + \varepsilon_{i,t} \tag{8}$$

Where  $MS_t$  is natural logarithm of money supply in year t

Step 3: the effect of interactions among the predictor variables and the moderator on dependent variable (Model 3):

$$SR_{i,t+1} = \alpha_0 + \beta_1 DE_{i,t} + \beta_2 DPS_{i,t} + \beta_3 QR_{i,t} + \beta_4 MS_t + \beta_5 MS_t DE_{i,t} + \beta_6 MS_t DPS_{i,t} + \beta_7 MS_t QR_{i,t} + \varepsilon_{i,t} \tag{9}$$

Where:  $MS_t DE_{i,t}$  is interaction of natural logarithm of money supply in year t and debt to equity ratio of company i in year t;  $MS_t DPS_{i,t}$  is interaction of natural logarithm of money supply in year t and dividend per share of company i in year t;  $MS_t QR_{i,t}$  is interaction of natural logarithm of money supply in year t and quick ratio of company i in year t. The disturbance term denoted as  $\varepsilon_{i,t}$  was assumed to be serially uncorrelated with mean zero.

## 4. Results and Analyses

Statistical software STATA 13.0 was employed to analyze the data. In addition, according to Basiruddin (2011), Ordinary Least Square (OLS) regression may not be an efficient estimator as some of the assumptions are not fulfilled. Therefore, this study as similar research such as (Kheradyar, Ibrahim, & Nor, 2011) applied generalized least squares (GLS) method to tackle the heteroskedasticity and non-normality distributed residuals.

### 4.1 Descriptive Statistics

An overview of the nature of the data is presented in table 1. This table presents the descriptive statistics details including the number of observations, minimum, maximum, mean and standard deviation for all the variables in this study. Moreover, the original value of stock return, total assets, money supply and interest rate are presented as well as their log forms.

Table 1. Descriptive Statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation
SR	2991	0.0334238	4.030512	1.942313	0.7253347
DE	3000	0	8.9437	0.6019867	0.893689
DPS	3000	0	0.9308903	0.0174546	0.0584713
QR	2733	0.01	27.59	1.882752	2.707478
BM	2990	0.05	20.43987	1.089716	1.45524
TA	3000	6.108458	10.78682	8.066754	0.7103446
MS	3000	25.70557	26.78745	26.246	0.3497253
OSR	2991	0.08	10726.84	412.4103	1142.694
OTA	3000	1283684	6.12E+10	9.28E+08	3.96E+09
OMS	3000	1.46E+11	4.30E+11	2.66E+11	9.23E+10
MSDE	3000	0	235.7855	15.78395	23.37906
MSDPS	3000	0	24.40195	0.4596342	1.538127
MSQR	2733	0.2678745	720.509	49.40938	70.94367

Note. SR = Log of Stock Return Index; DE = Debt to Equity Ratio; DPS = Dividend per Share; QR = Quick Ratio; BM = Book to Market Value; TA = Log of Total Assets; INT = Natural Log of Interest Rate; MS = Natural Log of Broad Money; OSR = Original Value of Stock Return Index; OTA = Original Value of Total Assets; OMS = Original Value of Broad Money; OINT = Original Value of Interest rate; INTDE = Interaction of INT and DE; INTDPS = Interaction of Interest rate and DPS; INTQR = Interaction of Interest rate and QR; MSDE = Interaction of Broad Money and DE; MSDPS = Interaction of Broad Money and DPS; MSQR = Interaction of Money Supply and QR.

#### 4.2 Empirical Results of Multiple Regressions

Table 2 presents the results of hierarchical multiple regressions related to Models 1, 2 and 3. Model 1 includes the selected microeconomic variables (DE, DPS, and QR) as independent variables (first step). Model 2 includes the moderator variables (second step). Model 3 includes the interaction terms (MSDE, MSDPS, and MSQR).

Table 2. The result of the Generalized Least Square (GLS) regression to examine the effect of DE, DPS, QR, and MS as moderator on stock return

Variables	Model 1 (Coefficient)	Model 2 (Coefficient)	Model 3 (Coefficient)
DE	-0.0933632*	-0.09466*	1.614912*
DPS	1.613494*	1.644628*	8.32916
QR	0.0135595*	0.013583*	-0.21349**
BM	0.1300604*	0.129793*	0.130493*
TA	0.5130087*	0.528224*	0.529442*
MS		-0.01309	0.010849
MSDE			-0.06546*
MSDPS			-0.25518
MSQR			0.00868**
cons	-2.327459	-2.10515	-2.74079
R <sup>2</sup>	0.3753	0.3754	0.3841
Change in R <sup>2</sup>	-	0.0001	0.0087
Sig. F	0.000	0.0000	0.0000

Note. \* significant at 1 percent level; \*\* significant at 5 percent level.

According to the results the F statistic in Model 1 is significant (Sig. F = 0.000) and shows R<sup>2</sup> of 0.3753, indicating that the selected microeconomic variables (DE, DPS, and QR) can explain 37.53% of the variations in stock return. Model 1 reveals that DE significantly and negatively (p-value < 0.01, Coefficient = -0.0933632) affects stock return, but DPS and QR significantly and positively (p-value < 0.01, Coefficient = 1.613494 and 0.0135595) affect stock return. Therefore, it can reasonably be concluded that hypotheses H1, H1a, H1b, and H1c are accepted.

Model 2 shows that the F statistic is significant (Sig. F = 0.000), but the impact of money supply on stock return is not significant (p-value > 0.1).

Model 3 which presents the impact of interaction terms (MSDE, MSDPS, and MSQR) on stock return is significant and has stronger explanatory power of 0.384. Model 3 shows 0.009 change in R<sup>2</sup> compared to model 2, which means that hypothesis H2 is accepted. Regarding the interaction terms (MSDE, MSDPS, and MSQR), the impact of MSDE is significant at 1% level and negative (p-value < 0.01, Coefficient = -0.06546), and the impact of MSQR is significant and positive at 5% level (p-value < 0.05, Coefficient = 0.00868), but the impact of MSDPS is not significant (p-value > 0.1). Therefore, based on the results of model 3 hypotheses H2, H2a and H2c are accepted, but hypothesis H2b is rejected.

#### 5. Discussion of Results

The first set of the findings in this study, which were based on the relationship between microeconomic variables (DE, DPS, and QR) and stock return in Malaysia, demonstrated that microeconomic variables could significantly influence stock return. Results pertaining to the effect of debt-to-equity on stock return showed significant negative influence, which is consistent with the pecking-order theory. However, according to the findings dividend per share positively affects stock return in Malaysia, which is consistent with the bird-in-hand theory. According to the results, quick ratio has a significant and positive impact on stock return which is consistent with the findings of Ulupui (2007), Chang et al (2010), Saleem & Rehman (2011) and Aga et al(2013). Relationships between microeconomic variables and stock return have been investigated in a considerable number of studies but they have presented various results. Studies on the impact of microeconomic variables on stock return in developing countries are limited compared to developed countries and they show contradicting results. Al-Shubiri (2010) studied the impact of microeconomic and macroeconomic variables on the Amman Stock Exchange for the period of 2005 -2008. Based on the findings of his study, dividend payout percentage was the only effective variable on stock price of the Amman Stock Exchange. However, Idris & Bala (2015) studied the effect of firms' specific characteristics on stock return in Nigeria and found debt-to-equity ratio as the only influential variable. Sari and Hutagaol (2009) conducted a study in Indonesia on the influence of capital structure, business risk, and the market risk. The results of their research showed that the capital structure, which is measured by debt to equity ratio, and stock return are highly and positively related. However, in another study carried out by (Ahmad, Abdullah, & Roslan, 2012) on the effect of capital structure on firm performance, there was no significant impact of short term, long term or total debt on firm performance. These conflicting results could be because of different methodologies, scopes, or lack of moderating or mediating variables (Hsu & Fang, 2009); (Kamukama, Ahiauzu, & Ntayi, 2011); (Ye, Chen, & Jin, 2006); (Dadashinasab & Sofian, 2014).

The second set of the findings in this study were related to the moderation effect of money supply on the relationship

between the selected microeconomic variables and stock return in Malaysia. Based on the results money supply is not individually value relevant to stock return, but it is value relevant through moderating the effect of microeconomic variables. According to the findings, debt-to-equity ratio and quick ratio are value relevant to stock return in the Malaysian context, both directly and through the moderation of money supply. Nevertheless, dividend per share is individually value relevant to stock return, but it is not value relevant through the moderation of money supply. Therefore, findings suggest that a higher amount of debt compared to equity results in a higher stock return in terms of raising money supply. Since a larger money supply leads to higher investment, demands for stocks would be higher. Meanwhile, in such an economic condition, money in circulation is increased which leads to more purchasing power for investors. In the meantime, companies could have a higher debt with lower risk in this condition, leading to a higher stock return. Moreover, findings suggest that quick ratio could positively affect stock return and could be value relevant to stock return through moderation of money supply. Firms with higher quick ratio are considered easier to liquidate and, also, money supply leads to more liquidity based on liquidity effect. Therefore, companies with a higher quick ratio could have a much higher stock return in the presence of a higher money supply. Modigliani and Miller's capital structure theory Ross et al. (2002) along with related studies by Urbanovský (2016), Rahman et al. (2009), Sieng and Leng (2005), R. Cooper et al (2004), and Omran (2003) support the findings.

## 6. Conclusion

This study examined the impact of 3 selected microeconomic variables (DE, DPS, QR) on stock return in Malaysia as well as testing the moderating effect of money supply on their relationships. The period of the study was from 2003 to 2012 and the sample population of this study was 300 companies listed on Kuala Lumpur Stock Exchange (KLSE). This study applied generalized least squares (GLS) method to tackle the heteroscedasticity and non-normality distributed residuals.

The results seem to suggest that the microeconomic variables have a strong explanatory power in stock return predictability. Based on the findings debt-to-equity ratio (DE) negatively, and dividend per share (DPS), and quick ratio (QR) positively affect the stock return in Malaysia. The negative impact of DE on stock return could be due to lower cost of debt. This means that companies with less amount of debt compare to equity have lower cost of debt and lower risk of bankruptcy, consequently they will have more demand for their stocks thus higher stock return. The positive impact of DPS on stock return is because most investors prefer the assurance of return through dividends rather than uncertainty of capital gain through changes in stock price. The positive influence of QR on stock return could be because higher QR gives the investors an assurance about the firm's ability to payout its debt. Therefore, stocks of companies with higher QR have more demand thus more increase in price and higher return on their stock.

This study also found that the impact of microeconomic variables on stock return could be moderated by money supply as a macroeconomic variable. The moderating impact of macroeconomic variables has been overlooked in previous research. According to the results of this research, the influence of microeconomic variables on stock return is increased by introducing money supply as a moderator. The findings suggest that higher amount of debt-to-equity ratio decreases the stock return in the subsequent year. However, in term of increasing money supply by policy makers, higher debt-to-equity ratio causes higher stock return in the following year. This could be as a result of lower cost of debt for the companies and consequently having lower bankruptcy risk, while money supply is high. Moreover, the results pertaining the impact of quick ratio on stock return suggest that higher quick ratio leads to higher stock return in subsequent year. However, based on the findings, increasing money supply decreases the positive effect of quick ratio on stock return. This might be due to taking advantage of lower cost of debt while money supply is high.

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# Understanding and Protecting Yourself against Threats in the Internet

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Received: August 8, 2017

Accepted: October 2, 2017

Online Published: November 28, 2017

doi:10.5539/ass.v13n12p201

URL: <https://doi.org/10.5539/ass.v13n12p201>

## Abstract

Reporting the incidents related to Computer Security has now become one of the most important component of the Information Technology programs with the increase in the attacks related to cyber security. The reason being the introduction of new and new security related incidents every day. It is giving light to the necessity of a quick and efficient incident response capability which could detect incidents, minimise the loss due to the destruction and mitigate the weaknesses that was exploited. This publication is a parameter for incident handling, especially for analysing event-related data and defining the appropriate response to each incident.

## 1. Banking Securely Online

### 1.1 Introduction

Online banking, ever since its inception, has posed threats to financial and personal security. Many users had been a prey to online banking threats. In order to avoid getting caught in the trap, one should get accustomed to various frauds and risks and secure by taking adequate precautions to avoid getting into security-related troubles. The following actions, to a greater extent help in avoiding security-related online banking problems:

- Assess and evaluate privacy and policy details
- Use complicated login details
- Secure your computer
- Have a check of available account balance periodically
- Refrain from accessing accounts from public places
- Enhance Credit cards usage
- Check email communications from banks regularly
- Ensure swift action when account is intruded into

### 1.2 Online banking attacks

A few of the widespread types of online attacks are

### 1.3 Phishing attacks

Phishing attacks are planned by using counterfeit emails or messages from an agency or person posing as a representative of the bank. The mail/message requests for personal, sensitive, banking data which needs to be typed into a link connected to a fake website. Once the link is followed and sensitive details are disclosed, intruders can gain access to banking related data. Phishing attacks also arise from pop-up windows with the real website address. Any data typed will reach fraudulent users. In a similar fashion, vishing is a fraud method where a person calls and pose as a bank authority to seek account details.

### 1.4 Malware

Malware is a software code initiated with evil purpose. Such malicious computer programs enable the user into trusting traditional security system for protecting during online transactions. Such softwares are designed to perform some of the following operations

- Steal account related data- malware monitors and captures login data including all the special characters, words or images used
- Fake website substitution- capable of generated illegitimate web pages that looks real. Such site enables an intruder to intercept user data without the knowledge of the user
- Account hijacking- malware hijacks the browser and transfer data and funds without the user's knowledge. Whenever logged into bank website, the software creates a hidden browser that reads account balance and enable fraudulent fund transfer to the intruder's account.

### 1.5 Pharming

This involves installing a secret and dangerous code on the computer that enters through an email or an attachment. Later, the user goes into a fake site that closely looks like the bank website. Any data entered is acquired by the intruders.

One interesting feature to be considered is that all the above attacks use technological acumen, which again is got only from the callous attitude of the user in his/her online money management. Though there is absolutely no assurance of safety related to online banking certain good practices can inhibit the fraudsters from attacking accounts.

**Periodic review of bank's online privacy features and actions-** banks should mandatorily send a copy of the privacy features to all their customers. Customers, from their side, are required to ensure that they adhere to additional security features authorised by the bank.

**Check the privacy policy of the company before initiating online payments-** always refrain or limit from disclosing unwanted private data. Also view any existing history of privacy violations from the bank's side.

**Always choose a complicated online personal identification number (PIN)-** always update or change PIN regularly. Avoid easy to guess numbers like birthdays. Never disclose PIN number to others.

**Install powerful anti-virus or anti-spyware programs and update them frequently-** always keep an updated version of anti-virus installed the computer to avoid gaining illegitimate access. Periodically agree to system upgrades.

#### *1.6 Regular assessment of online account activity*

**Using credit card for online payments-** credit cards have powerful protection than debit cards

**Refrain from accessing accounts in public places where chances of public monitoring are high-** avoid entering log in details from unsecured or public networks. Avoid computers or systems that are easily accessible by public as sometimes the account details can be deposited in the web browser's provisional memory.

**Always verify emails relating to online banking and check the authenticity of the contents and the sender-** avoid clicking suspicious links or replying to email requests or warnings regarding financial activity. As a precaution, forward the suspicious mail to the concerned authority and delete them from mail box.

**Any disclosure made by the user on a fraudulent website regarding financial activity must be immediately reported**

Agreed that online banking has its own risks. However judicious management of online activity will go a long way in preventing unauthorised access of financial information. Accustom to the rights and responsibilities of an online banking customer.

## **2. Cyber Threats to Mobile Phones**

### *2.1 Increasing mobile threats*

Smartphones or mobile phones, equipped with advanced features and capabilities as found in personal computers, are a hit with people. Despite its popularity, smart phones have become gullible objects for attackers. Though smartphones have outnumbered PCs in terms of units sold, they have become easy targets for attackers who have completely exploited their growing popularity. The attackers have resorted to sophisticated attacks on mobile phones which are more vulnerable than PCS, as they are yet to be equipped with counter attack measures. Smart phones and personal digital assistants provide users with facilities like internet and many other applications. Mobile phones are yet to embrace sophisticated technical security measures and use obsolete mobile phone operating systems. Mobile social networking do not own detailed privacy controls unlike the PCs. Sadly, most of the smart phone users are unaware of the security shortcomings. They remain ignorant of the fact that surfing internet on the mobile phones are as unsafe as surfing on PCs and that security softwares require to be enabled. Most of the users store sensitive data which are easy targets for attackers.

Mobile phones have become sophisticated and multiple utility devices with people using them to store emails, passwords, banking details, online transaction activities. They are easy prey for attacks due to their portability features as they are easy to rob and stolen phone exposes all the details to a shrewd attacker. Most of the apps are malicious as anyone can design apps for mobile operating systems with scant regard for safety. Sources that are not linked to mobile service providers offer unfettered apps that can break into locked phones by bypassing the lockout features. Just like in PCs, legitimate smartphone softwares can be attacked. The user himself can trigger off an attack clicking on a link that gives rise to passive attack or by just using a handset that has a susceptible app.

Phishing attacks use electronic communications to trap users into installing dangerous softwares. Just like in PCs, mobile phone users are susceptible to phishing, smishing and vishing attacks on both feature phones and smartphones. Users may receive fraudulent charges on their mobile phone bills or by soliciting donations especially in the name of donations after any major catastrophe. Mobile phone users consider the phone's security to be less important whereas in reality it can be controlled by an attacker by enabling it to perform harmful commands. Smart phones are also great carrier of viruses.

### *2.2 Steps to protect mobile phone*

Mobile phones have also developed sophisticated security solutions which were previously available only for PCs. Moreover, the security of the mobile phone is vested with the user who has to be cautious and judicious in matters relating to mobile security. In spite of taking precautionary measures, users can fall prey to mobile phone attacks. However, by adopting mobile phone security measures, the likelihood of an attack can be prevented.

- **Choose phones that give emphasis on security features-**Choose a device that offers file encryption that deletes malicious apps, that enable the service provider to erase the device remotely, that has an option to encrypt a backup, if any or that which support certificate based authentication.
- **Secure the device through configuration-** use password feature available in smartphones. By enabling this feature, by choosing a complex password, enabling encryption, remote wipe abilities and antivirus application all go a long way in protecting the mobile phone.
- **Configure web accounts to enable secure connections-** enabling configured web accounts prevents attackers from accessing web sessions
- **Refrain from accessing suspicious links or emails or messages-** they can lead to malicious content
- **Refrain from posting mobile number in public websites-** attackers can access mobile numbers from public websites and use them for future attacks

- **Choose what to store in the device-** be wise in storing data in the device as attackers can have access to the stored content with enough time and sophistication
  - **Choose apps wisely-** research on apps before installing them. Check on what details the app solicits. Do not install the app if it demands too much permissions for installing. It can turn out to be Trojan horse
  - **Have control of the device in public places-** the portability of mobile phones make them easy to be stolen. So have a physical control of the gadget
  - **Disable interfaces that are not in use-** attackers look at loopholes in the softwares that use the interfaces
  - **Keep Bluetooth enabled phones to non-discoverable mode-** keep the Bluetooth enabled in non-identifiable mode to make it invisible to fraudulent devices. If Bluetooth enabled devices are in discoverable mode, they can attract an infected device or attacker as they expose their visibility to them
  - **Avoid using unknown wi-fi networks or public wi-fi-** attackers may identify vulnerable devices from public wi-fi networks and can attack mobile hotspots
  - **Delete all data before disposing a device-** contact the device's manufacturer to understand about how to securely wipe the device before discarding
  - **Be vigilant when using social networking applications-** the apps reveal unwanted personal details and location to unintended parties
  - **Do not intrude the device-** third party firmware should not be used to access the device features that are locked by default.
- Timely action when smartphone or personal devices are stolen/lost**
- **Report the loss of the gadget to the organisation and mobile service provider-** intimate the loss to the organisation and service provider as soon as possible to hinder the malicious activities
  - **Convey the authorities/police about the loss-** appropriate actions can be taken by the local authorities when theft of gadgets are reported
  - **Change account permits-** when phones are used to access corporate networks, contact the IT faculty and revoke all the stored content on the lost phone
  - **If required, wipe phone-** if possible erase all the stored data on the phone by contacting the service provider

### 3. Play Safe: Avoid Online Gaming Threats

Sophisticated machineries, skills and high speed internet led to the rising popularity of online gaming. This has enabled pranksters and fraudsters to venture into this arena for illicit profits. Anybody using online games must be educated about the risks involved. Some of them are

- Interactions with cunning strangers who trick people into disclosing sensitive information
- Computer intruders who make use of security limitations
- Online and real world predators
- Viruses, compute wares and spyware

Some of the popular genre of games involve players to create online identities which perpetuate into real world activities. Virtual games are sold in real world for money. Similarly, real money is used to buy virtual world games. This activity has given rise to virtual crime. Online games are prone to technological risks and social risks.

#### 3.1 Technological risks

- a) **Viruses and worms-** they come in the form of attachments in mails, messages or through game files or installed softwares and intrude the computer systems
- b) **Malicious software-** fraudsters also capitalise on social networks linked to online games and solicit the users to fake websites or to open email attachments carrying dangerous software or content.
- c) **Insecure or compromised gamer servers-** insecure software on the game server poses a risk to the computer on which it is connected. Any game working using internet or connected to another computer is risky compared to the ones that is not linked to internet. Attackers can choose to install spyware, viruses or access personal details from vulnerable systems. By exploiting vulnerable codes available in online games, pranksters can read files, crash games and have complete control of the computer. Similarly operating a computer server running gaming apps involve the same risks as those involved with the operation of servers of other applications. Attackers can crash the server if it has poor security profile or insufficient protection. Sometimes, gaming protocols are inefficiently implemented and are not secure as other popular commercial softwares. As a result, it exposes the computer to unknown attacks.

#### 3.2 Social risks

Computer games, which were once solitary activities, have expanded to online communities. Intruders have harvested these interactions in such gaming environments to gain access to personal or sensitive information. Some of the social risks associated with online gaming are

- a) **Social engineering-** attackers may lure into installing softwares that can control and monitor online activities and lead to fake websites that offer malicious downloads on the pretext of online game apps
- b) **Identity theft-**fraudsters can gain personal data from the gaming profile and can create fake profiles or accounts in the stolen name or can even use it to access financial accounts.
- c) **Protection schemes-** there has been a rampant crime happening in gaming community. Protection rackets operate by warning weaker players of the community of negative consequences if real money is not paid.
- d) **Cyber prostitution-** sometimes pranksters create fake cyber brothel soliciting customers. And once the money is paid, the account gets deleted
- e) **Virtual mugging-**the players used software applications to defeat other players and took away their items to be sold online.

f) **Virtual sweatshop-** exchange of simulated items and virtual currency for tangible money has produced cybernetic sweatshop where workers from poorer countries are abused by people seeking profits from online economies

### 3.3 Protection from risks

By educating oneself about computer security, internet gaming can be safe and enjoyable. Basic computer security principles that need to be followed are using antivirus, using firewall, checking the authenticity of the downloaded files, cautious in opening attachments, creating a backup of financial data, using complex passwords and updating application software.

### 3.4 Gaming-oriented security principles

- a) **Identifying ‘administrator mode’ risks-** some games demand using the computer in admin mode. In such cases, it is imperative to ensure that the game vendor is authentic and reliable and the game has to be downloaded only from a trust worthy site. Free downloaded games are embedded with malicious software involving plugins that require that require to run certain games. In admin mode, the attacker can have a complete and easy access to the computer. And always ensure that the administrator password is private and close monitoring of kids’ online activities are advised.
- b) **Identify ActiveX and Javascript risks-** always be aware that some web games require ActiveX or Javascript to be enabled. This exposes many risks when the features are enabled.
- c) **Play the game on the game site-** it is always advisable and safe to play online games at the game site itself. This way, one can switch back to the user account to browse the web. This reduces the risk of landing on to a malicious website.
- d) **Pay attention to firewall management-** home users can use firewalls to safeguard their computers from risks. When multi player internet games are player, certain rules prompt the firewall to be lax in order to gain access to the computer. In such settings, there are higher chances of security threat to the computer. Sometimes, firewalls may allow certain IP addresses to be tagged trusted to reduce the chance of interacting with a fraudster who can infect the computer.

Online games are a great source of entertainment generating new industries and revenues and opening up the imagination of individuals. However, there are also risks involved, which can be dealt through judicious security management techniques.

## 4. Introduction to Information Security

As per the reports of Internet Software Consortium’s Internet Domain Survey, as on January 2008, approximately 542 million computers available over 250 countries on every continent, including Antarctica, was connected to the internet. The internet can be described as worldwide assembly of lightly linked networks, which can be reachable by distinct computer hosts, in many different ways, to any person owning a personal computer and an internet connection. The internet is not a single network and can be reached by individuals and organisations, irrespective of the national or geographical frontiers at any time of the day.

However, the ease and stress-free accessibility to data is laced with security threats and risks, the foremost risk being loss, theft or misuse of information. The data stored electronically and made available on networked computers are more susceptible to risks than those printed on paper and stored in cabinets. Intruders need not be physical present to steal data. In fact, they may operate from beyond geographical boundaries. They can steal or fiddle with the electronic content without leaving any trace of their illegal activity. They can generate new electronic documents, work on their own programs and keep their unauthorised activity under wraps.

### 4.1 Preliminary security theories

The preliminary security theories relating to content on the internet are confidentiality, availability and integrity. Security models relating to individuals who access the content are authentication, authorisation and nonrepudiation. When data is accessed by an unauthorised person, the result is loss of confidentiality. Confidentiality is pivotal to information like research data, health and insurance documents, new item dimensions and corporate venture strategies. There is a legal compulsion to defend the secrecy of individuals or organisations, principally for banks, loan firms, debt collectors, companies offering credit facility, hospitals, medical practitioners, medical records, institutes offering counselling or rehabilitation, tax collecting agencies. Information when available on an insecure network gets infected and the content gets modified. This result is called loss of integrity. Human activity by way of error or tampering can cause unauthorised changes to the content. Integrity is crucial for safety particularly for financial accomplishments such as electronic fund allocations, air traffic mechanism and financial accounting. When data becomes unavailable due to inaccessibility or if deleted, the result is loss of availability. This means that the required content cannot be accessed by authorised individuals. Availability feature is the most important element in service related businesses which predominantly use the information.

Availability of the network is imperative to businesses that are dependent on network connection. When users are denied or are unable to access the network or those facilities offered on a network, they go through denial of service. Authentication and authorisation are used by organisations in order to make the information available to those who actually require it. Authentication is establishing that the user is actually the same person who he/she claims to be. To prove the point, the user may have something tangible such as a smartcard or some hidden code like a password or something that proves the user’s identity like fingerprint. Authorisation involves finding out if the person/system has the power or right to operate certain activity on the system. Authentication and authorization operate simultaneously. Users should authenticate themselves before undertaking the operation they are authorised to carry out. Once authentication is done, the user cannot deny his/her action. Security is strong in such cases. This inability to deny the act done is called nonrepudiation.

Internet users always need to be assured of information security. That is, they should be convinced that

- The information they use is trust worthy
- The data for which they are responsible will be used only in the manner that is expected to be shared
- The information will be available for use when required
- The systems will process content in timely and trustworthy mode.

Information security assurance goes beyond system of different kinds like large scale systems, regulation systems, in-built system and it accommodates systems with hardware, software and mortal elements. It also takes care of system intrusions and laxity towards information safety.

Strangely, it is easy to get into an insecure network and gain unauthorised access to data. And above all, it is difficult to nab the intruders. Though, nothing worth stealing is stored on the system, intruders can use the computer as a weak link, paving way for unauthorised access to organisation's systems and information.

Sometimes those data that are normally considered unimportant or harmless, like type of hardware or software used, system patterns, type of network connections, contact numbers, access and authentication actions are of great interest to intruders. System security is at risk when security oriented content enable intruders to connect to important files and programs. Examples of important content are passwords, access control files and keys, manpower details and encryption processes.

All are vulnerable to security lapses and intrusions. Those affected comprise banks and financial institutions, insurance organisations, brokerage houses, consultants, government organisations, medical centres, medical laboratories, network service providers, functional institutions, education services, wholesale and retail traders. Some of the aftermaths of an intrusion are major loss of time in recovering from unruly situation, downward productivity, huge loss of money and man-hours, significant loss of credibility or business opportunity, legal liability, business crash and even loss of life. Sometimes, individuals may even go bankrupt due to leak of valuable information like financial content. Individuals can lose valuable details like credit card PIN, medical and other personal and confidential information. Individuals must be abreast with websites data that include alerts, cyber security tips, authorised people related to information security systems and people in power who may be capable of taking control of the situation and initiate appropriate action.

### 5. Understanding and Protecting Yourself Against Money Mule Schemes

Money Mules Are those people who are used to commit fraud by transporting stolen money or some kind of goods. Fraudsters recruit money mules to grab stolen credit card details. Sometimes, money mules are unaware of the fact that they are being used to commit fraud. But there are also money mules who participate willingly. The modus operandi is to extract money from organizations or from individuals.

#### 5.1 Schemes that look like legal options

The rampantly used money mule efforts are in the form of 'work from home' solicitations. They focus on the unsuspecting people who may be desperately looking to work from the comforts of their home. The solicitations are meticulously crafted so as to look like genuine offers from legitimate companies. Fraudsters structure the content or mail in such a manner that they are not filtered by spam filters and is designed to appear like communication from recognised companies. They even go to the extent of posting on jobsites where job aspirants are caught unawares.

The money mule scheme goes on like this:

Once the individual exhibits interest, the fake company gathers information like bank details and social security number from the employee, that is, the victim. He is also asked to sign a document that resembles a contract. As per the instructions from the company, the employee creates a financial account for funds transfer. The employee receives funds which are directed to be sent to a third party criminal. Many money mules operate this way and once the stolen fund is received by the criminal, the relationship is dissolved. The criminal recruits another mule for the next fund transfer. Throughout the process, the criminal's identity, involvement and intentions are hidden.

#### 5.2 Consequences

The criminal and the other parties involved in the scheme will face serious consequences if caught and found guilty. The potential penalties are

- **Inaccessible bank accounts-** the law enforcement authorities may freeze the mule's bank account which may result in financial crisis. There will be a burden due to the long term impact on credit sources
- **Prosecution-** money mules will be taken for a trial for their involvement in fraud.
- **Responsibility for the damages-** some mules found guilty will be held accountable and may have to repay the losses suffered by the victims.
- **Threat to personal data-** fraudsters are most interested in the personal information. They collect them from the money mules and can use them for malicious purposes.

**Effect on individuals-** The individuals who become victims may undergo the following consequences:

- **Financial loss-** an individual may lose money by paying for undelivered goods or money may be debited from their accounts. Depending on the charges framed or if culprits are booked, the individual may recover a part of the money lost.
- **Time consuming processes-** many hassles are involved right from identifying and reporting fraud to money recovery

**Effect on organisations-** when organisations are targeted, both the organisation and customers are affected.

- **Financial loss-** a fraudster may swindle a great deal of money.
- **Loss of sensitive data-** the criminal can steal customer data like financial data or use money mules to abuse customers
- **Goodwill loss-** the trust and loyalty of the customers will be lost if the organizations falls into fraud trap
- **Complicated processes-** many hassles are involved right from identifying and reporting fraud to money recovery
- **Possible future threats-** when prompt reactive and proactive measures are not taken, the organisation may fall into a new trap in future due to the loss of sensitive codes.

#### 5.3 Steps to protect self

- **Do not fall into money mule trap-** look out for warning signs and double check before volunteering to participate. On suspicious activity, immediately report to the concerned authorities



- **Warning signs-** the job offers that are fake do not describe the job duties, company location will not be disclosed, the candidate specifications may not be highlighted, only online interaction take place and above all lucrative offers are made for little efforts. The most important warning sign to look out for is the email address as it uses a web-based service rather than the company domain.
- **Research-** do a thorough research about the company, the contact person and the offer. If no significant result arise out of the research, be convinced that it is a scam and report to appropriate authorities.

#### 5.4 Steps to protect organisation

Criminals use fraudulent methods to connect to organisation's network and gain administrative access by using malicious code. By following certain preventive measures, organisation can reduce risks.

- Use strong firewalls, antivirus and anti-spyware software
- Restrict sensitive data to authorised staff only
- Always have a check on official records including employee data and financial transactions. Identify loopholes in the HR list
- Isolate computers used for performing banking operations. Apply strict access controls to such computers
- Look out for suspicious employee behaviour

### 6. The Perils of Using Portable Devices

Portable gadgets like jump drives, pen drives, personal audio devices and tablets offer users appropriate right to use corporate and personal data as and when needed. The increase in their uses is coupled with the increase in risks and threats. The fact that these devices are portable and enable them to connect to various networks and hosts make them prone to security breaches. These portable devices are vulnerable to theft which result in huge data loss, prone to data exposure when the confidential data is exposed to unauthorised people and susceptible to exposure to network oriented attacks to the system to which the device is connected.

#### 6.1 Describing Portable Devices

There are two subsections of portable devices:

- Basic media devices that use a wired connection to a host transferring data (example, jump drives, mass media cards, CDs, DVDs and music devices without Wi-Fi competency)
- Smart media devices that can move data with a wired or non-cellular wireless association (for example, tablets, gaming devices, music devices with Wi-Fi competency and e-readers). These devices are predominantly used to check email, browse web and download various applications, audio and files

#### 6.2 Risks involved

Using simple storage media looks safe, but it poses many hitches for a user or an organization. Most of the malware (malicious content) is transferred today through USB tools. These tools such as a jump drive or music device plug into the USB port of the PC and can enclose malware that is copied unintentionally or may get attached automatically. Attackers have become tech-savvy and have designed sophisticated methods to launch malicious code. Once a system gets affected, the malware spreads to other system in the network. These devices are capable of installing malware inside any firewall set up on PC and are not easily detectable. The portable storage devices being handy, gives easy access even for insiders to indulge in malpractices as they are hard to track.

Smart gadgets stealthily infect systems when downloading some content that has virus. Their rampant usage by a huge population and the absence of effective security tools make them great carriers of malware. There is also a large scale loss of data or data exposure as people tend to store sensitive content in their smart devices which when run on untrusted applications pose risk. Also, the attractive features of some of the smart devices attract threats. For instance, when Bluetooth is on, the device becomes visible to malicious attackers. Similarly, private and public wi-fi networks are hotbeds for attackers to intercept unencrypted data. The most common threat to smart devices is the handiness of the device. It can be easily left behind and is easy to be stolen.

#### 6.3 How to Minimize These Risks

Some of the recommended practices to reduce the risks are

1. **For portable storage media - when making use of storage media such as jump drives, CDs and music devices without Wi-Fi competency**
  - Install antivirus software powerful enough to detect any malicious attacks after scanning
  - Refrain from connecting any unknown jump drive or media device to PC before checking it from IT personnel
  - Disable autorun and autoplay features from all portable media devices
  - Ensure that there are separate devices for storing professional and personal data and run it only in the allowed systems.
  - Secure all confidential content using powerful encryptions. Once the data is copied or transferred from a USB drive, ensure that it is deleted using delete utility
2. **For portable smart device when using smart tools such as tablets, music devices with Wi-Fi competency and e-readers:**
  - Protect the tool by means of a strong PIN or secret code or password and alter it frequently.
  - Download content only from trusted, verified and reliable sources or from the commercial store recommended by the device manufacturer

- Scan the entire device periodically by running anti malware software and take appropriate action when suspicious applications are detected
- Set an idle time out for the device to lock, in case there occurs a time delay in using it.
- If the device support location tracking, activate it to track the location of the device if it gets lost or stolen.
- Disable Bluetooth or wifi when not using it.
- Do not attempt to jail break the device, that is, do not try to remove the limitations set by the manufacturer
- Activate a remote-wiping facility to delete all contents on the device when misplaced
- When using wi-fi, ensure that the network is encrypted

### 3. For portable smart devices that are used in organisations

- Educate the employees about the policies imposed on the use of the kinds of removable devices allowed into the work environment. Ensure that the device has a significance in a particular business case
- Create acceptable policies for all removable devices used by the employees
- Advise the employees to report any missing devices in order to wipe out data
- Advise the employees to use strong, secret codes for the devices
- Access should be allowed only through a protected VPN connection
- Ban personal portable devices in work set up
- Organisation may consider the feasibility of distributing corporate controlled devices for the employees
- Have a check list of mobile storage devices that carry important data and audit them on a regular basis.

## 7. Socializing Securely- Using Social Networking Services

Social networking enable people to receive and disseminate data with others online. People all over the world communicate with each other from their mobile devices, applications and websites. Reports prove that Facebook is accessed by more than 500 million active users, Twitter by 175 million users, MySpace by 100 million and LinkedIn by 80 million. These social networking sites provide different purposes, the primary one being networking with others. Apart from that they are used for building new associates, reconnecting with old friends, maintain existing relationships, promote professional assignments or discussions. Sites like Facebook and Twitter cater to wide range of people whereas LinkedIn stands for professional networking and interactions. MySpace caters to those interested in music and entertainment.

### 7.1 Risks Involved

One should be cautious and have awareness regarding the likely hazards of sharing information on networking sites.

- **Threats and over disclosure of information**

Pranksters may attack social media services and spread malwares, access personal information like identity, location, relationship details, etc. Sometimes, the users themselves may reveal too much information than intended to unauthorised individuals.

1. **Viruses-** social networking sites are an ideal breeding ground for viruses given their immense popularity. When a virus is created and embedded in a website, the attacker puts many unsuspecting users to risk who transfer the malicious links with their list of friends.
  2. **Tools-** fraudsters make use of tools to regulate a user's account and then accesses the personal information of the users and the contacts he share. There may also be an attacker posing as an imposter.
  3. **Social engineering attacks-** the attackers may post a comment or content that looks to be initiated from a genuine networking service. If acted based on the instructions, the user may end up revealing too much information or pave way for computer attack.
  4. **Identity theft-** when personal information lands into the hands of the attackers, they may assume the identity of the user and post contents in his/her name
  5. **Third party applications-** sometimes social networking sites allow addition of third party applications. Though it may look harmless, it is capable of accessing intimate details without the knowledge of the user and post content, send spams, access friends list, etc.
- **Professional and personal effects-** professional or persona relationships may be compromised due to unscrupulous access
    1. **Business details-** disclosing official content on social sites are unethical as well as harmful and causes considerable damage to professional life. Revealing customer details, internal issues of the company, intellectual property or other company matters on social media may bring about a bad reputation.
    2. **Professional status-** inappropriate photos or posts on social networking sites may destroy the professional prospects. Recruiters or colleges may verify the accounts of their prospective candidates during the screening process. Contents posted by the candidate that reveal the political, religious or social orientation may hinder the chances of selection and affect the credibility or reliability of the candidates. There have been incidents of people being sacked from their jobs for the kind of contents posted.
    3. **Personal relationship-** it is difficult to control the audience for certain posts. The comments, photos or contents posted impulsively may do much harm to personal relationships. Being transparent about the personal life on social media does much damage than expected as it is difficult to retract immediately. Almost 33 percent of the users have expressed their regret for revealing too much information.

4. **Personal safety**- there have been many incidents of cyber bullying. The contents posted may harm not only the user but also many others who are tagged in the posts or photos. The information posted unsuspectingly may invite unwanted harassment. Posting details such as the location, address, children's school details are much dangerous and may even compromise on the child's security. Cyberbullying incidents have harmed many individuals psychologically. So, social media pose as a physical, psychological or even social threat to the user if he does not manage his account meticulously.

#### 7.2 Treading with Caution

The user must always be aware that the social media is filled with risks and security threats. With adequate proactive measures, this situation can be altered into an enjoyable process. Proper security measures adopting will protect the user as well as the computer from malicious attacks. By protecting oneself, those connected around can also be secured.

#### 7.3 Putting security measures into use

Social media offer unique risks. However, the user need not panic when using social media. The risks can be minimized and can be made entertaining and informative by adopting certain precautionary and proactive measures. The following points need to be remembered while using social media.

- Set strong, complicated and difficult to guess passwords for each service.
- Always keep the anti-virus softwares updated
- Timely installation and updating of applications and softwares are pivotal to system safety
- **Use strong privacy settings**- the security options provided by the social networking sites should be completely implemented into the account. By taking advantage of the services provided, the user is protecting self, others and the computer system. Do not compromise on the security and choose appropriate action for better protection of privacy. The services may update their security settings periodically. So always keep a tab on the safety features provided and regularly evaluate the settings and options, looking for changes and choosing the safest feature. A regular review of services' privacy policies are recommended to ensure that the user has adopted and incorporate all the necessary measures..
- **Do not encourage suspicious third party applications**- choose third party application judiciously. Do not install suspicious looking softwares or those devised by unscrupulous or unreliable vendors. Keep a check on the amount of details that third party applications can access. Always look for applications developed by trust worthy vendors.
- **Remember that everything is public**- be aware that anything posted on social media cannot evade public access. So the intelligent way to protect oneself is by limiting the amount of personal data posted on social media. This applies not only to the profile of the user, but also is applicable on the contents, comments or images posted. Always be vigilant about the responses from fellow users. Be cautious on the kinds of contents posted about self, others and particularly children. Always refrain from divulging details about children as it may attract criminals to the children which may cause irreparable harm to them.
- **Share information only with known people**- social media provided the option of choosing an audience for posts. While posting content choose the right viewers who can see the posts. Though many users try to increase their contact lists, consider sharing contents with the appropriate audience. Always group the contacts and assign access features differently for each group. Attackers are shrewd enough to convince users to include them in their close circle. They may even adopt fake identities to convince the user to be added as a contact. Double check the authenticity of the new contact b and confirm the identity who they claim to be before letting him access the personal details. However, it is recommended to always add people known to the user than add unknown fraudsters just for the sake of expanding the contacts base. Better be cautious than regret later.

Regardless of extreme restrictive and privacy measures adopted, social media are not competent enough to provide complete privacy. It is these loopholes that attackers will capitalise on for intrusions. The attacker may take advantage of the weak security aspects of an application or software. So as a responsible user, post content carefully and intelligently. Social media cannot be made free from risks. Manoeuvre as if the content is a public property and refrain from sharing anything that will put oneself as well as the contacts and those around at risk.

#### 7.4 South Korean Malware Attack

Reports and specifications regarding the malware used on March 20, 2013 to attack South Korean have been vague and inconsistent. There are however, some varied versions from different organisations regarding the malware, named Dark Seoul. The attack strategy was as follows

- The infected file erases the master boot record (MBR) and other files.
- The malware was attached with an execution date and time and was designed to search machines having administrative connection to servers
- The targets were South Koreans
- The malware operates on multiple operating systems
- Simple design with potential for huge damage

While studying the risks, it was found that DarkSeoul was designed to escape the typical South Korean antivirus. This malware was designed as a low risk to U.S. Critical Infrastructure and Key Resources (CIKR), however, the operators should relentlessly continue the strategies to avoid infection and transmission of any type of malware that may attack their networks.

#### 7.5 Defensive Measures

On the basis of the above mentioned parameters of attack, US-CERT began to work towards a robust network model that can withstand any future attack on their enterprise. The intention is to minimise damage and maximise the business functions as

soon as possible.

- Educate users on the need to transfer important files to network shares to pave way for central backup.
- Ensure daily backups of all important systems including offline and online copies
- Frequent execution of data restoration from backups for integrity of available processes
- Set up emergency communication plans in case of non-availability of network resources.
- Segregate critical networks from business systems
- Identify critical systems and analyse the importance of on hand spares for faster service retrieval
- Absence of internal monitoring system will lead to compromise of management services and destabilise security controls. Ensure strong password policy
- Maintain the latest antivirus engines and limit the user's ability to install and use unwarranted software applications
- Have updated operating system patches
- Disable unwanted workstations and servers
- Check for suspicious attachments and delete them. Also scan all software downloaded from internet before running them
- Be cautious when using removable storage devices
- Limit the number of cached credentials for all portable devices
- When administrative accounts are compromised, malicious activity occurs.

## 8. Knowing Voice over Internet Protocol (VoIP)

Voice over Internet Protocol (VoIP) is a method of communication that enable making phone calls through broadband internet connection in the place of the conventional analogue telephone lines. VoIP allows to call others who can receive calls via internet. VoIP is increasingly used communication alternative for consumers. It is expected that VoIP is set to gain further popularity given the trend of decreasing broadband service rate. With the increasing usage of VoIP, expect an increase in threats to the user too. VoIP threats are almost similar to those on the internet. However, newer risks, tricks and unique IP telephony attacks are evolving.

### 8.1 VoIP configurations

#### • Routers

These instruments allow using the typical phone to make VoIP calls. They are linked to cable/DSL modems and enable attaching the conventional telephone. After configuration with an appropriate VoIP provider, these units do not require a special software or connection with computer. The number can be dialled and can be spoken through the phone. An adapter can be used to place calls when travelling, given the availability of broadband internet access.

#### • Adapters (USB)

These devices use conventional phones to make VoIP calls. A simple ordinary phone is attached to the standard modular phone jack. Once connected, the software places calls.

#### • Software-controlled VoIP applications: "softphones"

These are software applications, also known as softphones that enable to make VoIP phone calls straight from PV using headset, microphone and sound card. The applications and services help users to talk to other people who can access similar service.

#### • VoIP phones

A VoIP phone resembles an ordinary telephone but links right to a computer network unlike a phone that connects to a phone line. A devoted VoIP phone may include a phone and a base location that links to the internet or may work on local wireless network.

### 8.2 Requirements and Availability

One should be accustomed to the demands, supplies and possible service restrictions of VoIP service before changing to VoIP as a means of communication.

#### Requirements

VoIP connects to the Internet through an ISP, a VoIP service to expand to traditional landlines and VoIP software to make calls. It should be noted that Digital Subscriber Line (DSL) internet service make use of traditional phone lines for internet connection.

#### Availability due to power outages

During a typical electricity shut off, VoIP becomes unobtainable because VoIP devices (computers, routers, adapters) rely on a power source to operate. Traditional phone lines work during such a power shutdown, which is deemed a major plus in an emergency. It is recommended to use an unhindered power supply (UPS) with a VoIP installation for operating during a power outage.

#### Availability due to bandwidth

VoIP communication function only using a high-speed (broadband) internet connection for reliable functionality. A typical broadband connection is prone to service disruptions or deprivation of quality which is due to internet traffic.

### 8.3 Threats / Risks

VoIP faces similar threats that is characteristic to any internet application. Internet users are already used to the nuisance of

email abuse by way of spam and phishing attempts. VoIP opens up yet another route for certain annoyances like abuse, spams and phishing attempts, which causes spam via internet telephony (SPIT), spoofing and identity theft. Additionally, the privacy of VoIP interactions can be questioned.

#### *Spam over internet telephony (SPIT)*

There will be annoying telemarketing calls and spams typical to any telephone user. However, a concept called spam over internet telephony has emerged which has exposed to the user to large volumes of unsolicited calls and spam voice messages.

#### *Spoofing*

It is possible for an attacker to deceive an unsuspecting user. By establishing a bogus caller ID into an ordinary VoIP call, the receiver trusts the incoming call. He may unknowingly disclose vital information. This is a VoIP version of phishing. Attackers with the pieces of details obtained may use it for faking identity of another.

#### *Privacy concerns*

The confidentiality element in VoIP is questionable. VoIP transmits unencrypted data over the internet. So it becomes precisely possible to collect VoIP data and start a conversation.

#### *8.4 Steps to Protect from threats*

Many of the methods used for safe VoIP are the similar for other internet applications. A few of the key steps of good personal computing are

- Mount anti-virus and anti-spyware series.
- Be wary about accessing files embedded in email messages or instant messages.
- Check the legitimacy and safety of the downloaded documents and new software.
- Ensure personal or financial data is secured.
- Create complicated passwords.
- Keep application software updated.
- Do not divulge personal information to unknown individuals
- Use encryption software for both installation and for the caller at the other end when using a software VoIP application

### **9. Protecting Aggregated Data**

There is a reliance on collection and processing of huge amount of electronic data or aggregated data which in turn has initiated the evolution of sophisticated database software and hardwares with huge storage capacity. When organisations are storing and processing such vast data, they are vulnerable to serious threats such as attacks from cyber criminals, compromise of confidential data through illegal copying and altering of content and threat to the privacy and control of data. Such pervasive nature has serious implications on the day to day functioning of business such as inability to fulfil customer transactions, breach of trust, violation of laws pertaining to protection of data and exposure to law suits. These risks can be leveraged through judicious implementation of security practices. Organisations must attach tangible value to the data in order to develop and execute security plans. The strategies developed should address all issues relating to vulnerability, breach of trust and its consequences, data manipulations, disclosure or loss, ramifications to organisations and plans for strengthening business-customer relationships.

Information security personnel are forever on their toes with the increasing number of cyber-attacks. With the decreasing cost of storage devices, enormous amount of data are being aggregated thus exposing it to risks. This aggregated data are compressed into electronic warehouses and are free from physical or operational demands of those using them. Aggregated data are vulnerable to both natural and man-made disasters. Information is the lifeline of any organisation. Therefore adequate precautions must be taken to preserve it from attackers. In information security, it is the data that prescribes the security necessities. In the run to protect data, organisations aggregate data in one or more logical locations and risk loss of control, use and ownership of data. Some of these problems and issues are as given below

#### **9.1 Replication and Persistence**

Aggregated data, when left unguarded, can be easily duplicated, shared, reformed and damaged. Just as a physical object that is created and destroyed easily, aggregated data too should be laced with the same attributes. However, this is impossible given the ease with which they can be replicated

#### *9.2 Ownership*

Another group of parameters question the ownership and guardianship of aggregated data. Continuing the likeness with a tangible object, the proof of identity of those who own and operate should be bounded and well understood. In reality, aggregated data rarely has responsible owner. Aggregated data has ever changing ownership and custodianship because of the simplicity with which electronic data is shared and duplicated.

#### *9.3 Transformation*

Aggregated data undergoes constant change. As far as electronic content is concerned, change is inevitable. Data is treated, scrutinised and aggregated to produce information. There is a continuous conversion of data into data because organizations use fresh data within a given context and yields information and intelligence. The question of ownership is lost in this transit.

#### *9.4 Valuation*

It is difficult to attach a monetary value to the data. The worth of the aggregated data to an organization can be ascertained if the person answerable to the organizational process recognises and approves on what exactly is being valued. Valuing aggregated data considering its unique characteristics, is vital for ascertaining the risks, the effects and thus can calculate the

necessary investments in securing strategies and security arrangements.

**Know the Risks and Effects-** understand what would happen if

- Customer details are revealed
- Brand loses credibility due to data leakage
- Confidential data is stolen by rival
- Organisation is labelled incompetent in terms of privacy and data securing guidelines
- Network crashes due to data compromise
- Cannot identify data compromise

Once the organisation finds answers to the above, they can work on details such as money to invest, the area to which protection should be maximised and degree to which risk should be quantified. Organisational resources that are gravely affected due to security compromise are trust, ability to offer and fulfil customer needs, stakeholders' identity and privacy and ability to be compliant with legal regulations. There is an immediate impact on the organisation when security is threatened.

## 10. Protection Principles for huge Volumes of Aggregated Data

### 10.1 Comprehend the Information

The primary step in shielding anything is to comprehend its contents. For aggregated data, this includes knowledge of what information are available, where it is available and in what form. Ascertaining a required level of protection also need an understanding of the safety demands, its proprietors and custodians and likely risks and impacts. The owners and custodians must be aware of the worth of the data they possess. The potential impact of the data to the organisation reveals the value. Once the worth of the data and the extent to which risks can disturb the organisation or individual are ascertained, a meaningful profile can be designed against which management and security panels can be applied.

### 10.2 Apply realistic Management Doctrines

Adopt a set of universally accepted management doctrines in defining what defence strategies are suitable to protect aggregated data. Organizations can adopt principles to choose, infer, rank, organize, and underline policies, approaches, plans and actions. To be operative, principle assortment and Analysis should line up with organizational goals. The principles relevant to protecting and securing aggregated data are Accountability, Adequacy Awareness Compliance Measurement Response and Risk Management. Regulations are chosen to meticulously moderate peril and their performance is periodically measured and studied. Remedial action for risk mitigation are established and implemented after each assessment.

### 10.3 Application of Reliable Security Measures

In sync with management principles, a good set of usually followed security processes protect the organization's aggregated data. The areas that require protection of all kinds of information including aggregated data are

1. **Information Security Strategy:** The strategy incorporates and defines the organization's information security package, comprising of all the actions and operations that are implemented to ensure the mission's existence.
2. **Information Security Policy:** Information security policies are the accumulation of regulatory principles which the organization defines in order to set the standards of behaviour for using information properties and its effects, including aggregated data.
3. **Security Structure and Design:** Security structure and design is the tangible and rational execution of the organization's security schemes, policies, guidelines and techniques. It is the organization's methodological implementation of security pattern throughout multiple strata of the technical arrangement.
4. **Incident Management:** Incident management can be viewed as the organization's measures for recognising, recording and reacting to suspected security incidents and desecrations.
5. **Partner Management:** Partner management practices and activities ensure that vendors and service providers behave in the manner that assist the existence of the parent organization.
6. **Emergency Planning and Disaster Recovery:** Emergency planning and disaster recovery guides the measures and movements taken by the organization to continue the standard functioning of various activities when confronted with significant or hostile interference.
7. **Physical Security Management:** Physical security is a module of the inclusive protection plans, especially for concrete aggregated data assets such as hardware, software and media.
8. **Information Technology:** Information technology security is the array of practical instruments which the organization installs to enable and implement policy, principles and procedures.
9. **Audit and Monitoring:** Monitoring and auditing examine and scrutinize the extent to which the organization's strategies are being employed and surveyed. Monitoring activities are the roadmaps by which the organization systematically verifies its security system for flaws and susceptibilities and pledges suitable actions wherever necessary.
10. **Liability Management:** Liability management decides the procedural and functional vulnerabilities in the technical arrangement where aggregated data is located and how to proactively lessen the faults. Liability assessment is a defensive monitoring movement where systems and networks are checked for known technical flaws or faults.
11. **Software License Agreements: Disregard at Your Own Risk**

End User License Agreement or EULA is a legal bond between the user and the software publisher. It elaborates on the clauses and circumstances for using the software. For example, it might insist on installing the software on only a single computer for personal use. It might also state that by agreeing to terms, the user also agrees to third-party interference or

permit other users to access the computer. When refused to accept the terms and conditions of the EULA, the software cannot be legally used.

### *11.1 Importance of EULA*

EULAs encompasses a number of items that need to be seriously considered before installing the software. The following facts about EULA should be noted.

- 1. EULAs are legally binding-** though the legality of EULAs can be challenged mentioning about the hidden terms and conditions, the user is bound to enter into a legal agreement by accepting the terms.
- 2. EULA restrict the software use-** restrictions like the number of computers in which it can be installed, prohibiting software testing and publishing results and prohibiting reverse engineering are placed upon the user.
- 3. EULA demand agreeing to certain terms-** force the user to use all bundled modules of a software bundle even those produced by third party publishers and permission to monitor the internet activity and sharing of resources.
- 4. EULA cannot be sued for damages-** includes clause that restricts the user from suing the publisher for any damage incurred.

Pay attention to the following terms and conditions imposed in EULA as it may affect the online security.

- permits the third parties or publisher to monitor the internet activity
- permits the third party or publisher to gather personal details
- permits the software publisher to use computing resources
- binds the user to the terms of EULAs governing third party software modules

The following recommendations can be followed to protect from security and privacy issues related to EULA

### *11.2 Read the EULA before installing the software*

Though it is boring to read through the entire list of conditions, it will definitely spare from hassles in future and is the only means by which the user understands the privacy and security issues he might encounter by assenting to the EULA's terms. Always ensure that the terms and conditions are understood. Contact the software publisher with any queries and clarification about any specific points. Software publishers often display their EULAs online.

### *11.3 Consider the software publisher.*

When in doubt about the publisher, assess the EULA covering its software with extra attention. Publishers having good reputation are less probable to participate in fraudulent business practices like strange, ambiguous or masked clauses and conditions in the EULAs that dictate the use of their software. However, a company's credible business reputation is not a justification for skipping to read EULA. The good corporate status should not deter from reading and understanding the terms and conditions that govern its software. When handling softwares by unfamiliar publishers, review EULA with extra care. Be vigilant if the software is added with any new software from third party publishers

### *11.4 Beware of firewall reminders when installing software*

During setting up of software, there may be firewall reminders asking for certain access to pass. This needs to be carefully scrutinised. Review EULA to understand why such a prompt must be encouraged. Ensure that the software requires changes only for normal operation. For example, if EULA requires monitoring and access to specified directories, tread with caution. In the case of bundled software, EULAs may request for permission to monitor and access directory which may not be included in the primary software's EULA. These EULA conditions may exist in the third-party software EULAs. Firewall prompts may indicate that bad software has been shoved into the software package for installation. When in doubt regarding firewall conditions based on reminders got during setting up of software, look up the software's user or installation guide. Proceed when reasonably convinced about the legitimacy of an appeal.

### *11.5 Beware of "open" or "free" software, mainly peer-to-peer (P2P) file-sharing software.*

Seldom is anything genuinely free. Assess the EULA to check out what is required for installing the software and analyse the effect of this on the security of the computer and its contents. Many "free" software programs, like the file-sharing programs, regularly ask for a non- payable fee for their use. This non-payable fee is elaborated in the EULA and elaborates what is needed in return for using the software. This may be in the form of compulsory installation of modules that threaten security and secrecy.

### *11.6 EULAs, Security and Privacy*

Privacy and security issues emerge from overlooking EULAs or by consenting to EULA terms that exposed users to hazards. The risks can also arise from poorly fared software business contexts in which the primary software publisher is unsuccessful in verifying its partners' software for worms, security matters and agreement with its EULA. The risk that is invited when consenting to definite EULA terms is not restricted to one's own data or device, but can also cover other computers and data linked to the network.

### *11.7 Observing Software EULAs*

EULAs and bundled software can associate and generate security problems. Sometimes the malware that the user unintentionally installs verifies all of the Internet behaviour, containing the normal web browsing history in addition to the activity performed via secure sessions. Therefore, always scrutinize and assess any EULA that requires permission to monitor the online activity. The user should be ready to risk sharing intimate information to a third party. Even if the user is taking the risk of surrendering personal details to a third party, monitoring software can create bigger privacy and security issues. When weighing the impact of a EULA on privacy issues, think beyond the bigger confidentiality and security issues that the software might pose.

### 11.8 File-Sharing EULAs

Peer-to-peer (P2P) file-sharing programs are immensely widespread, but they initiate huge trouble for those related to safety and security. By consenting to the EULAs, the user permits third parties to monitor the internet activity and which in turn is shared with advertisers. Unknown people too, get the opportunity to access the directories on computer. There are popular P2P program that requires installation of bundled software that can convert the system into a dispersal passage for third-party software and content producers. The following are the perils associated with P2P file-sharing software:

- Increased susceptibility to Trojan horses and bugs
- higher risk to private details
- increased coverage to software errors that infect computer
- higher vulnerability to security flaws that can expose computer to exploitation

### 11.9 Resource Sharing EULAs

Sometimes, the service provider would change the terms of its EULA to support its other initiatives. Any request for permitting even restricted access of computer to another third party should be handled with extreme attention. Yielding to this kind of regulation may lead the third party to redesign the computer configurations in a manner that affects its security mechanisms. Also, consenting to the revised EULA will result in being accustomed to their computers connecting to other sources independently. The user may hardly decipher that the connection occurred as a result of a virus or spyware and not due to the existence of resource sharing software.

### 11.10 Third-Party Software and Surging EULAs

Mostly, the software purchased or downloaded is coupled with third-party software. Usually, the third-party modules establish their own EULA which may involve “downstream” third-party modules which are also covered by their own EULAs. This makes it difficult and confusing for the user to comprehend as to what is being agreed upon when installing the software and how all these EULAs affect the security and privacy of the computer. “Downstream” third-party software EULAs are many in number, making it difficult to comprehend the terms and conditions based on which the software can be used. It also puts up the question of the knowledge of chief software publisher about the downstream third-party software elements and their license contracts. It is imperative to be cautious when confronted with EULA that binds to the clauses of all third-party software EULAs. Do not make the mistake of assuming that the chief software publisher would have assessed the third-party EULAs and software.

## 12. Spyware

Spyware is a sort of malevolent software (malware) that gathers data from a computing structure without seeking the user’s permission. Spyware has become more pervasive due to the fact that online attackers and conventional offenders use it as an instrument to commit felony against individuals, industries and governments. Spyware causes monetary loss, thereby reducing consumers’ trust in online transactions and their inclination towards modern electronic commerce. To combat its widespread use, spyware should be made less lucrative for the offenders who make it available. Contemporary solutions that battle with spyware look at searching, stalling or eradicating it. Spyware can seize keystrokes, screenshots, validation permits, private email ids, web form data, internet practices and a host of different private information. The document obtained is often handed over to online assailants who make money by selling it to those who need them or use it for executing fraudulent activities. Spyware is widely used by online invaders, advertising organizations, structured crime and reliable insiders.

**Online Attackers-** the basic motive is to steal personal information for committing financial crimes or to sell it those who commit such crimes or for identity theft

**Marketing Organizations-** look for personal details, browsing habits and trend related content to undertake marketing movements like spam and spim messages, browser popups, home page stealing.

**Spying by a reliable Insider-** Trust-worthy insiders are those who have direct contact or contact to computer systems for valid reasons. A reliable insider is someone, say an employee, who uses spyware to gather confidential business secrets that can be sold in the illegal market, or used for blackmail or used to seek more valuable data for a later use.

Another example of the trusted insider group includes intimate members of the family or close relatives spying to catch inappropriate behaviour.

Spyware can observe almost every activity or data associated with computing milieu. This is not just restricted to contents on hard drives but also comprise of back-up data. When spyware operates on a computer system, every data is within the access of a malicious programmer. Most vulnerable data include internet habits, email and contact information, windows-protected Store data, clipboard data, keystrokes, screenshots and network traffic.

### 12.1 Effects of Spyware

Spyware leads to decreased confidence and trust in online business dealings. Just like the problem of fake currency in the real market, spyware destabilizes online economy. Consumers’ willingness to indulge in online money transactions will be reduced fearing personal financial loss. In the run to control the risk, vendors and financial institutions often resort to additional authentication and loss anticipation modules at an exorbitant operational cost. Though financial organizations shield an individual from loss incurred from online fraud, the cost incurred to govern loss-prevention programs are ultimately borne by consumers by way of higher service fees, interest rates or highly priced goods and services. Consequently, growth rates nosedives, costs rise up and demand shrinks.

Depending on the type of spyware modules installed on a system, users may go through substantial performance loss. Systems under spyware attack exhibits reliability issues. Affected systems may become unstable, causing significant loss of output and data. Mostly, spyware is impossible to erase without an exhaustive understanding of its working methods or by



taking extreme measures such as erasing the entire system. For the system to function all over again, the operating system and applications are required to be reinstalled.

Spyware risks the systems even in future as the malicious content is capable of controlling the system over a long period of time. The profound information gathered by spyware often includes log in IDs that can be utilised for future access to the affected system. People seldom change the login name and password and use it for many other systems or accounts. Therefore, these stolen contents can be used to break into uninfected systems. This opens up newer avenues for committing additional information theft or malware installation. Spyware also threatens the computer by installing backdoor access systems. These backdoors help the malware operator to regulate the system, to command the system, to download and operate indiscriminate applications. Attackers can access many infected systems without infecting a single system.

### 12.2 Common Spyware Systems

There are numerous versions of malware. Many versions of malware act basically as spyware, while many other malware series contain spyware components.

Some commonly observed forms of spyware and their operating traits are as follows:

**Browser session hijacking-** This type of spyware works to alter the user's browser features. Though hijacked spyware can be embedded in various ways, the motive is to change the way the browser operates so that the user is driven to sites of the malware creator's choice.

These redirects usually take the users to promotional sites that can earn the hijackers some charges when visited by users.

**Browser Helper Objects-** Browser Helper Objects (BHOs) are a component of Internet Explorer that can be misused by spyware, but they are difficult to be detected. BHOs can read all files, network assets and anything that can be accessed by the user who introduced Internet Explorer. Malicious BHOs can be embedded via a stand-alone dropper. Droppers are a distinct type of malware that give other malware to the user they intend to affect. They usually function by installing spurious files on the device and then alter the system in a manner permitting the newly written malware files to be operated. Another popular social engineering method is to flood the user with recurrent pop-up appeals to connect the software. It stops only when the user exits the site or consents to install the constituent. Once installed, it can run freely, download and connect to new malware or even change browser settings permitting malware to be downloaded without a warning or interaction with the user.

**Cookies and Web Bugs-** Cookies are bits of data kept on the user's system by a web server. During successive visits, the web server can recover these cookies. Often, cookies are utilised for keeping user authentication, favourites and other kinds of user-related information. The cookies can then be used to find parts of the user's browsing preferences. Web bugs are HTML components, which often exist like image tags that regain data from a remote web site. While the image is not noticeable to the user, it can give valuable information about the operator on request. Web bugs are mostly implanted in web pages and HTML-enabled email messages.

**Fake Antispyware Tools-** There are applications existing on some internet sites that claim to be spyware detection or deletion tools, when they are actually spyware.

**Autonomous Spyware-** Usually, autonomous spyware work as a distinct process or introduces itself into other processes operating on the system. This type of spyware mostly gets activated when logged onto the computer and can reach the contents of the computer. As autonomous spyware is just a malicious application, it can be premeditated to execute almost all types of spying activities.

**Bots-** A distinctive group of malware known as a bot or zombie is one of the most potential malware threats. Bots are remote operated proxies run on the system. Bots are mostly controlled distantly via Internet Relay Chat (IRC). Once a system is corrupted using a bot, it becomes a component of a bot network (botnet) It is used in sync with other botnet members to undertake the functions ordered by the bot creator or bot herder.

### 12.3 Precautions

To prevent the spreading of spyware and other malware, it is pivotal to exercise caution to distrustful actions on the computer and to adopt safe computing techniques. While a few spywares are positioned by taking advantage of the loopholes in operating systems or applications, most of them still banks on social engineering to mislead the user into installing or operating the malware. Always exercise restraint when downloading stuff from public web sites, newsgroups, fast messaging sessions or even when accessing email attachments from known senders. Identity on the internet cannot be verified. Usually, assailants and their malware imitate acquaintances of the target victim to persuade them into running the malicious code.

**Do not rely on unknown or known high-risk sources-** Be cautious when surfing unknown websites. Dangerous sites comprise those with many popups, persistent requests to operate browser components and those with content that is oriented on illegal titles such as software hacking.

**Read the fine print-** On deciding to work on an application obtained via the internet, ensure that the entire license or privacy documents related to the software are thoroughly understood. Lengthy or hard to understand agreements should be considered as a warning sign and installing the application should be reconsidered.

**Exercise attention when loading applications-** Software installation sets sometimes exploit a user's tendency to ignore the minute details and simply consent to the default "checked" alternatives. If the default options are thoughtlessly clicked and prompts are disregarded, there can be loading of spyware, adware or other applications that are undesirable. Read the instructions thoroughly to stay safe.

**Keep an updated operating system-** Keep systems and applications updated with security-related patches including patching up of the operating system and all installed applications.

**When running Windows XP, install service pack 2-** Windows XP service pack 2 includes several structures that will

prevent spyware. It encompasses pop-up blocking, an upgraded automated latest process, an improved host firewall and security options for protection from drive-by installations of malware.

#### *12.4 Antivirus and Antispyware Tools*

Installing credible antivirus and antispyware tools and keeping them up to date is pivotal to computer security and is an important caution-strategy.

#### **Browser Settings**

Configure the browser to block active content and other potentially infectious content can go a long way in increasing online security. Disabling active content features block many threats. However, it is also prone to damage many modern web sites and applications. But, the richness of the browsing experience will be diminished. One ideal browser configuration strategy that is used to mitigate the risk related to active content, while still allowing authentic sites, is enabling the use of Internet Explorer security zones.

#### **Email Configuration**

In an email program, design it to send and exhibit email using simply the text, instead of html. This eradicates most of the threats arising out of embedded script, web bugs and other HTML-enabled systems executed by attackers. But merely using plain text decreases the functioning of some features. Further, many email clients are now providing the facility to disable scripting and block pictures until a user initiates action to show them.

#### **Operate your Computer securely**

Nearly all spyware needs a spark to start itself when the user is operating the computer. Spyware often works in combination with system start-up, user login or when specific applications, say an internet browser or any other software is introduced. Every application that spontaneously starts is not malicious, however, it is better to recognize which software is genuine. One ideal mode to find and deactivate spyware on the system is to inspect the software loaded on the computer and ascertain whether it starts up automatically or not. Windows XP Service Pack 2, a new feature, supplemented to Internet Explorer, permits some management of browser add-ons. Using this instrument, reviewing, enabling and disabling add-ons like BHOs and ActiveX, controls can be undertaken. This tool is available

in Internet Explorer, below the heading 'Internet Options' on the Programs tab, when clicked on the 'Manage Add-ons' button.

### **13. Virus Basics**

**Virus-** A computer virus is defined as a program that attacks by initially affecting files and the system locations of a computer or network router's hard drive, and then generating duplicates of itself. Though some viruses are benign, others are malicious and can infect data files or simple files. Earlier, viruses used to spread when people shared portable media, but now viruses are primarily transferred via email texts. Unlike worms, viruses need an action initiated by the user, like opening an email attachment or visiting a malicious web page to be transferred to other sources. The virus is a program and is capable of doing anything that a normal program does. Some viruses are created to intentionally destroy files whereas others are designed to be transferred to other computers.

**Worm-** A worm is a sort of virus that can be transmitted without human involvement. Worms transfer from one computer to another and affect memory and network bandwidth, which leads to malfunctioning of the system. Worms permit attackers to gain access to computer remotely.

**Trojan horse-** A Trojan horse can be termed a computer program that encompasses a virus or other fatal program within it. A Trojan horse can be a platform that is supposed to do one activity when, in fact, it carries out a malicious activity on the computer. Trojan horses can be packed into a software that is downloaded for no charge or as attachments in email messages. Primarily viruses, Trojan horses and worms are triggered or activated the moment an attachment is opened or when a link contained in an email message is clicked. If the email client has scripting option, then it is likely that a virus is transferred by just opening a message. It is best to restrict to the HTML that is available in email messages. The ideal way to see email messages is in plain text. Most users get affected due to opening and operating unknown email attachments. Always ensure that the contents of the file are known before resorting to opening. Contact the sender of the mail before opening the attachment to cross check if it was indeed sent by them. If the user receives a mail or message with an attachment from an unknown sender, delete them immediately without opening the attachment. Opt to check email messages in plain text rather than in HTML. This goes a long way in tackling virus infection.

#### *13.1 Tips to protect from viruses and reduce their effect*

- Load anti-virus software from a reliable vendor and update it frequently.
- More than just scanning for viruses on a periodic basis, load an "on access" scanner and configure it every time you start your computer.
- Run a virus scan before opening any new program or file that likely contain an executable code, including packaged software which is bought or downloaded.
- Be wary of accepting files or clicking links that people send within online communities.
- Ensure that there is a back-up data to avoid loss of valuable data due to virus infection.

### **14. Using Wireless Technology Securely**

The recent years have seen wireless networking becoming more accessible, reasonably priced and easy to use. Home users are deploying wireless technology in amazing numbers. When working on wireless technology or those considering to move to wireless, it is mandatory to understand the security issues one may encounter.

#### 14.1 Threats in Wireless Connections at homes

Those intending to shift to a wireless connection at home, should consider the security issues that rise when internet connection is opened to the airwaves.

The following sections elaborate on some of the risks to home wireless networks.

#### 14.2 Piggybacking

When wireless network is not secured, anyone having a wireless-activated computer within periphery of the wireless access plug can intrude on the internet using the wireless connection. The normal indoor broadcast distance of an access point is 150 to 300 feet. Outdoors, this distance can reach up to 1000 feet. Inability to protect wireless network could possibly make the internet connection accessible to a many other users. Doing so is laden with a series of problems:

- Service violations- when the sum of connections exceed the permissible limit set by the internet service provider
- Band width shortage- illegal users may exhaust the bandwidth and make the connection slow
- Abuse by malicious users- other users may commit illegal activity which will be tracked to the genuine user
- Monitoring the internet activity- malicious users may watch the internet activities and try to steal sensitive credentials
- Direct attack on computer- illegal users can access the contents of the computer, install spyware and establish control over the computer

#### 14.3 War driving

War driving is a particular type of piggybacking. The broadcast distance of a wireless access point enable internet connections to be accessible beyond the home limits even extending to the streets. Tech savvy computer experts drive around cities with a wireless-equipped looking for unsecured wireless networks. This exercise is called war driving. War drivers expose the details of the location of unsecured wireless networks on web sites to operate their illegal online activity.

#### 14.4 Unauthorized Computer Access

An unprotected wireless network in symphony with unsecured file sharing is a deadly combination. These are the perfect conditions for a malicious user who could gain entry to any manuals and files capable of being shared.

#### 14.5 Protecting Home Wireless

It is clear that the security problems related to wireless networking are inevitable. For this, there are certain measures to be taken for protection.

**Keep the Wireless Network hidden** -Wireless access points display their availability to wireless-powered computers. However, everyone need not know the presence of a wireless network at home. To keep the network hidden to others, check the access point's user guide for directions on deactivating identifier broadcasting.

**Change the name of the Wireless Network**- Most of the wireless access point systems have a default name. The default names used by various manufacturers can assist in gaining illegitimate access to the network as the names are widely known. While renaming the network, choose a name that would be difficult to be predicted by others.

**Encrypt the Network Traffic flow**- the wireless access point system should be permitted to encrypt traffic flow movement between the system and computers. Encrypting wireless traffic enables transforming it to a programme that can be comprehended by computers with the correct hint to that programme.

**Change the Administrator Password**- ensure that the administrator password is changed to protect it from unauthorised access. This is because the already set default password is widely known by others and permits easy unauthorised access.

**Use File Sharing with Caution**- always use password protection for anything that is being shared. If the file sharing option is unnecessary, disable it.

**Keep the Access Point Software Patched and Up to Date**- always update the system software or patches for periodic healing of bugs.

**Check the Internet Provider's Wireless Security Options**- check the customer assistance section of the provider's website for getting information about securing home wireless network.

#### 14.6 Public Wireless Threats

A wireless-enabled device are convenient even outside our home or work environment but they are vulnerable to many security threats.

The following are a few of the security risks that one encounters when working on a public access point.

##### Evil Twin Attacks

In an evil twin attack, the attacker collects details about a public access plug. He establishes his own device to impersonate the actual access plug. Gullible users will connect using the stronger, fake signal. The attacker can then view any content the victim transfers over the internet.

##### Wireless Sniffing

Almost all public access points are not secured leading to sensitive communications or transactions prone to threat. The malicious users can use "sniffing" devices to acquire sensitive information of the users like financial details or passwords

##### Peer-to-Peer Connections

Many laptops can create informal networks when they exist near one another. These networks create computer-to-computer connections. An intruder with a network card designed for ad hoc mode and operates on similar features as your computer, he can easily get unapproved access to personal files

## Unauthorized Computer Access

Just as with unprotected home wireless networks, an unprotected public wireless network having unsecured file transferring capability can have disastrous consequences. Under these conditions, an intruder could gain entry to any documents and files permissible for sharing.

### Shoulder Surfing

In public wireless spaces, the intruders are always on the vigil to steal sensitive information.

A public place is itself an opportunity for the intruders. If close enough, they can just look over when typing. They can peer through binoculars or by just watching, can steal all confidential, personal information.

#### 14.7 Secure Wireless Networking in Public Spaces

Using the internet via a public wireless access plug is laden with serious security issues which is multiplied by the incompetence to govern the security setup of the wireless network. The following steps can be taken for protection.

#### 14.8 Be vigilant when online in public space

In public place, it is an unsecured, unencrypted network connection. So be vigilant when online. The probability that another user, available on the network, watching the online activity is high. So avoid online financial activities, online shopping, sending email and typing passwords or credit card details.

#### 14.9 Connect Using a VPN

Many establishments have a virtual private network (VPN) which permit their staff to connect safely to their network, when not in office. VPNs encrypt connections at the sending and receiving points and drive out movement that is not encrypted.

#### 14.10 Disable File Sharing

File transferring in public wireless spaces is far riskier than on home wireless network. This is because the wireless-powered laptop is more likely to be near to other computers run by unknown people. Also, many public wireless networks have peer-to-peer networking. To prevent attackers from reading sensitive files, deactivate file sharing feature when linking to a public wireless access plug. Seek help to study the ways to disable file transferring.

#### 14.11 Be Alert of Your Surroundings

When using an open wireless access plug, be cautious of the surroundings. Check if others are using their computers in close vicinity. Check if someone can get a view of the screen. If an internet connection is not necessary, deactivate wireless networking totally. If there is a necessity to connect, use caution and follow the protection steps.

## 15. Data Backup Options

All computer users should always back up the critical data they are keen to store and safeguard, to safeguard it from loss or corruption. Keeping just a single backup file may not be sufficient to protect information.

### 15.1 Remote Backup – Cloud Storage

The recent widespread expansion of broadband internet facility has enabled cloud storage accessible to a broad range of computer users. Cloud service users access the internet to connect to a common group of computing assets like networks, servers, storage, applications and services owned by a cloud service provider. Remote backup services can safeguard data from natural catastrophes or critical malfunctioning of local devices infected by malware. Additionally, cloud services give 'anytime- anywhere' connectivity to data and applications on availability of an internet connection. But, the cloud's reliance on the internet can hamper communications between the user and the cloud. Further, there are no world-wide accepted yardsticks, platforms or codes for cloud computing. Cloud customers are ignorant about the service provider's cloud framework or its dependability and users lose control over their own data. Cloud service providers encrypt user data, thus protecting from access of critical information. Shared clouds pile up an individual's data along with many other users' data in the same cloud framework, thus posing a potential security threat. Prior to entrusting vital data to a cloud service provider, analyse the service contract for security practices.

### 15.2 Internal Hard Disk Drives

Hard disk drives stock data on a revolving magnetic tray read by a moving read/write head. Almost every desktop and laptop computers use their internal hard drive to pile up data required to operate as well as store the user's primary files. Secondary systems and backup servers stock information on internal hard drives. Hard drives are rewritable and can be used to perform rolling backups. Having main file copies and its backup files on the same internal hard drive permits updating backup files and maintaining a simple file structure, all without the additional hassle of acquiring any other storage device. However, rolling backups can slowly disseminate corruption or malware in the basic files to the backup files. Also, if internal hard drive is spoiled, stolen or infected, both primary and backup files will be lost. Additionally, the computer always uses the internal hard drive. Therefore, the more backup files, lesser the space on computer. Backup files kept on the internal hard drive are equally susceptible to destruction and corruption as the primary files. Ironically, internal hard drives are only as safe as the computers that stocks them.

### 15.3 Removable Storage Media

Storage media that permits the user to connect and disconnect from computer are a more reliable backup alternative than the computer's internal hard drive. Physical extrication of backups from computer keeps data secure, both from online fraudsters and power fluctuations. Removable media are portable and work on most computers. Their availability in a wide variety of storage dimensions and rates help find the one that fits the requirements and budget. Further, they are also reusable. But, their portability makes them vulnerable to loss or theft. Rolling backups may move infection from the primary files to the backups. Removable storage media gives direct regulation over data. So, the user himself is responsible for protecting that data.

#### 15.4 Types of Removable Storage Media

**External Hard Disk Drives** - External hard drives are similar to internal hard drives, but they are handy and easy to load. But, they are still prone to destruction and are huger than solid-state storage of similar capacity.

**Solid-State Storage** - Solid-state storage, also known as flash drives, USB flash drives, thumb drives, SD and micro-SD cards, memory sticks and solid state drives (SSD), are popular portable storage media. Solid state devices are small, resistant to shock and access data quickly. USB drives are small and can be plugged-and-played on computers. Solid state media are rewritable. They do not pile data magnetically and so are free from the danger of corruption.

**Optical Storage** - Optical storage media, such as CDs, DVDs and Blu-ray discs, accumulate information on reflective discs read by a moving laser head. Storage capacity differs greatly from the available optical media, that is, from 682 megabytes on CDs to 9.4 gigabytes on DVDs and up to 50 gigabytes on Blu-ray discs. Most computers have some kind of internal optical disc drive available. Content on non-rewritable discs cannot be inadvertently deleted or receive infections or malware from other sorts of primary files.

**Magnetic Tape**- A digital tape system contains a tape deck, individual tapes and sometimes, a tape auto-loader. Individual digital tapes can offer storage of over one terabyte, or approximately a thousand gigabytes and are inexpensive. Once loaded, digital tape systems are equipped for very less user interaction and process data swiftly. The reusable tapes power the rolling backups and are less prone to infections than hard disks

**Floppy or ZIP Disks**- Floppy disks and ZIP disks preserve data on spinning magnetic trays, almost like hard drives. The biggest disadvantage is their low storage capacity compared to other storage devices, and the drives that read them currently out-dated and are not manufactured, thus making floppy disks and ZIP disks obsolete.

#### 15.5 Choosing the Best Backup Option

Before choosing a data backup option, evaluate the pros, cons and security issues of each device, financial resources, requirements such as the size of back up data, security for sensitive data and accessibility of data. Home users having little data can opt for preserving primary files on the hard drive of their system or remote storage. People or small traders who have large amounts of non-sensitive data can keep their files on their hard drives or servers. Large businesses or organizations may choose to keep one backup copy onsite and another offsite either through a dedicated data service or on the organization's private offsite servers or digital tape system.

### 16. Disposing of Devices Safely

#### 16.1 Why protect data

After buying a new computer system, notebook, tablet or any other gadget that is necessary, latest and enjoyable, we may decide to dispose off the old equipment. We may choose the device for recycle, or to be given to a friend or contribute it to a charity. However, it is most important to safeguard the information on it from becoming public. But erasing information can be cumbersome. Systems protect us from losing vital information and help in getting it back when we delete a file. Similarly, others who get hold of the thrown off device can get back the data, too. We need to be extra cautious in removing contents from the computing systems before disposing them to prevent from revealing private information, such as financial credentials, social security figures, health information and personal details and passwords. Otherwise, we may face threat of identity theft. Similarly, computing devices engaged for business purposes, when not disposed properly, will reveal sensitive information such as customer and employee details. Business reputation, customer confidence, exposing financial details are all revealed. Removing data from computing devices is called clearing. Clearing is a procedure of media wiping that prevents data to be repossessed back by disk or file recovery services. It must withstand keystroke recovery attempts from standard input and from data scavenging devices.

#### 16.2 Techniques for erasing Information

There are three ways of erasing information from computing devices. They are deleting, overwriting and physically damaging the device containing vital information.

##### Deleting

Deleting information is least effective. It removes pointers to information on computer, but does not erase the information as such. Deletion method that we normally use when operating on computer, like shifting a file to the trash or a recycle bin, or selecting "delete" from a menu, is not a reliable method. In spite of trash being emptied, the information still exist there. It can again be reclaimed.

##### Overwriting

Overwriting is operational on all computing systems. It puts unsystematic data on information, which is impossible to be retrieved because it has already been eradicated. While professionals agree on the process of such random or unsystematic data, they differ on the number of times overwriting should be done to ensure safety. There have been debates regarding this. While some say that doing it once is enough, others stick on to doing it at least three times, after which "zeroing" the drive needs to be done. There are many overwriting mechanisms available. A few of them are open source and are freely available. Darik's Boot and Nuke (DBAN) is a widely used tool that completely erases the drive. Eraser can be used to safely erase individual files. Refrain from using these tools if it is a solid-state drive. Secure Erase and Parted Magic are effective on every drive, especially when we select "secure delete." Parted Magic supplies many options along with its data sanitizing gears.

##### Physical demolition

Physical demolition is the best way to thwart others from reclaiming vital information. Of course, physical destruction should be carried out on the device only if we do not intend to donate it to others. Specialized services will degenerate, burn, dissolve or crush the computer drive and other devices. If for some motive, we do not wish to seek someone else's assistance,

it is possible to damage the hard drive ourselves, by puncturing it with nails, making holes into the device or even hammering it. However, do not ever burn a hard drive or insert it in the microwave oven or dispense acid on it. Some crushers are armed to damage flexible devices such as CDs and DVDs. If we smash or shred the device our self, make the pieces tiny enough to avoid data from being rebuilt. Magnetic devices such as tapes, hard drives and floppy disks can be ruined by degaussing, that is, showing them to a very strong magnet. Degaussing is more applicable and feasible for businesses than individuals, due to the expenditure that will be incurred. It should not be carried out if someone else requires the use of the device because degaussing damages not only the data but also the “firmware” that assists the device to operate.

### *16.3 Destroying data in Mobile Phones and Tablets*

Although the step by step process for erasing all information from mobile phone and tablet vary for each product and model, the general procedure is the same.

1. Take out the memory card, if the device uses one.
2. Take out the SIM (Subscriber Identity Module) card.
3. Under the Settings option, select Master Reset, Wipe Memory, Erase All Contents and Settings. This may require entering a password, if the set has one, or seek assistance of an approved dealer that sells the device for a factory-set password.
4. Manually damage the memory card and SIM card or stock them in a protected place. Memory cards and SIM cards can be used again in a phone that has the same model.
5. Ensure that the account has been closed and/or moved to another new device.

## **17. Conclusion**

Computing devices permit huge amount of data at our disposal. When we discard a gadget or donate it to someone else, there is a threat of revealing information to people who are not supposed to have it. A haphazardly disposed gadget can have a big deal of useful and sensitive information. The data preserved electronically on such discarded devices can be safely prevented from landing into the wrong hands by following the above processes. We have to be a responsible user of such technology stuffed gadgets to protect ourselves and environment from unreparable damages.

## **18. Common Perils of Using Business Apps in the Cloud**

The cloud is the theory of distantly held IT services, labelled cloud apps, delivered by a seller. These sellers are called cloud providers. Normally, cloud apps presented by cloud givers include email, calendar, files, online storage, sales, customer support and many more. Incorporating business apps in the cloud has widely accepted benefits- saving money by paying for the required IT computing possessions only, ramping up or down computing resources quickly without capital investment and spreading the influence to employees and users anywhere in the world.

### *18.1 Common Perils of the Cloud*

**There is no total control-** When IT services are bought from a cloud provider, there is no comprehensive regulation over the computing resources that the business requires for functioning. Situations like cloud provider winding up business or changes its services or prices is not discussed. Sometimes, there may an outage resulting in severe damages that can impact business, customers and economy as a whole.

**Getting trapped with one supplier-** Every cloud provider is different in terms of their platforms using different hardware, software, configurations and settings. Therefore, suddenly shifting from one supplier to another can be impractical, even when using the same app. The user might get trapped with one supplier and migrating will be really difficult. An app may behave differently on another cloud. Switching from one provider to another will be practical only when there is more standardization across cloud providers.

**Data is preserved by someone else-** When using a cloud provider, the data is stored and secured by the cloud provider. Despite the provider being more equipped to buy the latest security software and assistance, it may not protect data as the user does. Business vitals can be lost or mishandled and data may be stalled because of a government action. Confidential data can be stolen when a scrupulous intruder takes the encryption code required to connect to data. Further, cloud provider is likely to be located in a different location from business physically. The locations of these data centres have legal repercussions and are bound by the laws of the countries in which they operate. If the data centre gets entangled in a criminal case, the laws governing business in the country and the state where it is located, enforce stringent laws on data control. Also, many countries have stricter laws for encryption.

**Security is managed by someone else-** Usually, cloud providers have avenues that are more protected than our own because they are richer in resources compared to measures taken by organizations for security. Cloud providers accommodate numerous customers' data on the same servers and operate a huge bulk of data than even large organizations. So they are the most desirable pawns for cyber criminals.

**Beg for information-** Unbelievably, some of the popular cloud providers do not permit their customers to undertake audits. Some cloud providers offer the audit results to their customers.

However, not all audits are identical.

### *18.2 Risk Relief in the Cloud*

#### **Be Aware**

Have awareness about the job roles of staff members in the organization. Keep watch over their actions related to work on clouds providers. Staff may purchase some services easily on credit or through free trials, unaware of the threats.

#### **Be an intelligent consumer**

Select suppliers who agree to contracts that enable effective functioning of business. In particular, ensure that the cloud provider's security regulations are sufficiently in sync to business-needs. Almost all cloud-provider license agreements have

clauses that protect the cloud provider from being responsible for loss to a business arising due to a service outage. Always negotiate on those terms. If possible, negotiate contract terms that outline requirements for the computing assets. Also, be aware of the data location and the laws that apply to those locations.

#### **Accommodate the correct people in cloud decisions**

Supplier selection, monitoring and management skills are mandatory to manage suppliers involved in the business. Find experts in supply-chain management. Accommodate both corporate leaders and IT professionals in decision making regarding choice of cloud provider.

#### **Be cautious**

Establish trust with cloud providers vigilantly. Begin by using the cloud for unimportant services and evaluate the provider's performance. Over time, build trust depending on what services to seek from cloud. Be choosy about what to control and what to be maintained on the cloud. Match the risks and benefits of preserving the apps and data on systems versus the pros and cons of transferring it to the cloud. Instead of being controlled by the cloud provider, the keys can be governed by business to ensure that the data be recovered.

#### **Observe the cloud provider's actions**

Identify methods to confirm that the terms of the SLA are honoured. Keep updated of the security related conditions incorporated by the cloud provider and its skill to be abreast with developments in cyber-crime. Ensure that there is right to use the same information if the service was in held in the organization itself. Include conditions in the SLA that highlights the right to access the information without resistance.

#### **Be prepared for cloud outages**

All cloud providers have shut downs. Clarify about the cloud provider's disaster contingency plans. Investigate a novel approach where a private cloud works along with a public cloud. Also opt for a multi-public cloud execution of a service through two or more cloud providers.

Cloud apps for business are a big boon but just ensure that the risks and its effects on business and industry are completely understood. Use an augmentation approach and form trust slowly by monitoring cloud provider's activities and have a contingency layout for cloud outages.

### **19. The Basics of Cloud Computing**

Cloud computing is a payment-based service where we can acquire networked storing space and computer assets. The cloud makes the required information accessible from anywhere, any time. While a conventional computer setup requires physical presence in the exact location as data storage device, the cloud makes that step redundant. The cloud removes the need for physical existence at a given location as that of the hardware that stores data. The cloud giver can both possess and accommodate the hardware and software required to operate the applications. This is especially supportive for companies that can ill -afford the exact amount of hardware and storage space. Small companies can approach the cloud to preserve data, thus eliminating the cost of purchasing and preserving memory devices. A business can look for more space or decrease their subscription as per their business growth. The only prerequisite is that there is a need for an internet connection for accessing the cloud.

#### *19.1 Types of clouds*

There are diverse categories of clouds that can be subscribed depending on the requirements.

1. Public Cloud – Accessible by any customer who has an internet connection and connectivity to the cloud space.
2. Private Cloud - A private cloud is set up for a definite group or organization and restricts connectivity to only that group.
3. Community Cloud - A community cloud is one that is mutually divided among two or more organizations who have identical cloud specifications.
4. Hybrid Cloud - A hybrid cloud is fundamentally an amalgamation of at least two clouds, where they are a mixture of public, private or community clouds.

#### *19.2 Selecting a cloud provider*

Each cloud provider aids in a specific function, providing users with limited control over their cloud based on the type. When choosing a provider, compare the needs to the cloud services available. The cloud prerequisites will be influenced by how the space and assets associated with the cloud be used. For personal home use, there is a need for a different type of cloud and a provider compared to the cloud for business. Depending on the technological needs storage space can be bought from cloud provider.

There are three types of cloud providers that we can subscribe to

1. **Software as a Service** - A SaaS provider gives subscribers right of entry or access to both resources and applications. In a SaaS agreement, the subscriber has no control over the cloud.
2. **Platform as a Service** - A PaaS provider gives customers rights to use the elements that they need for developing and operating applications on the internet.
3. **Infrastructure as a Service** - An IaaS agreement, as the name suggests, deals predominantly with computational arrangement. In an IaaS document, the subscriber completely sub-contracts the storage and resources, such as the required hardware and software components.

The cloud provider has the least power in an IaaS system than with a SaaS agreement.

The subscriber has the autonomy to choose the degree of control over his/her data and kinds of services that is required from a cloud provider. For example, people operating small business cannot meet the expense of purchasing and storing entire

hardware and software necessary to stay in the competitive market. By subscribing to an arrangement as a Service cloud, he can run the new business with the computational sophistication of a larger company, by paying only for the storage space and bandwidth that is used. Assessing the current computational resources, the level of control expected, the financial situation, and the future of business must be taken into account before signing up with a cloud provider. After a detailed analysis of the requirements, research into different cloud providers will give better insights of which is suitable.

### *19.3 Security*

The information contained on the cloud is often seen as treasured to individuals with mischievous intentions. There are plenty of personal information and likely secret content that people preserve on their computers and these information are now shifted to the cloud. This makes it imperative to recognize the security precautions that the cloud provider offers. Likewise, it is important to take personal measures to secure data. The foremost thing to be considered is the security measures that the cloud provider offers. The security parameters vary from one provider to another and among the different types of clouds. Points to be noted are the decoding methods the providers offer, methods of protection for the actual hardware that houses data, the availability of backups of data, firewalls etc.

Most cloud providers have standard terms and conditions for different range of subscribers. The home user may not have any concession in their cloud contract. A small business user is likely to have slightly better negotiation related to the terms of their agreement document with the provider. It is pivotal to choose a cloud provider that gives the security of data as the major priority. In spite of being extra careful with personal data, merely subscribing to the cloud will make security to be compromised and transfer control to an external source. The distance between the subscriber and the geographical location of data forms a hurdle. It may generate more room for a third party access to information. However, to enjoy of the paybacks of the cloud, we will have to forego direct control of data. Most cloud providers will have enough expertise on how to manage data and keep it secure. A cloud provider is equipped with more resources and proficiency than the average user in securing their computers and networks.

The cloud provides numerous alternatives for the everyday computer users- large and small businesses alike. It unbolts the lock to the domain of computing to a wider range of users and enhances the comfort by giving links through any internet connection. However, the increased ease has its drawbacks. The cloud is a gullible victim for any malicious activity and has serious security issues because it can be operated through an unprotected internet connection. When using the cloud, ensure that protection is given to the information and the person responsible for access on the cloud is trustworthy. Additionally, subscribers should possess knowledge of alternatives in terms of what type of cloud is suited, what type of provider will be most convenient and the reputation and responsibilities of the providers before signing up.

## **20. Office and Home Router Security**

Home routers are an inseparable part of the modern tech savvy society with its widespread use in work from home options, home business, school assignments, social networking, personal financial management and entertainment. The internet service provider delivers preconfigured, ready to use wired or wireless routers. Often, the home users are unaware of the configuration settings and do not perform any additional or advanced settings. But, the default configuration of the home routers provide no security features thereby exposing the networks prone to attacks. Small organizations use these same routers without proper implementation of security measures due to lack of funding for advanced IT infrastructure.

### *20.1 Security Apprehensions*

The in-built configurations of home routers expose them to security issues. Home routers, being directly operational from the internet, are easily noticeable and in many cases are misconfigured. These traits help an intruder find the most suitable victim. The wireless feature, integrated into many of these devices, is an addition to the already existing threat. The following mitigation steps are aimed at intensifying the security of home routers and decrease the susceptibility of the internal network against attacks from external fronts.

**1. Alter the default login username and password-** Makers already set default usernames and passwords for router devices and provide the same to customers to configure the system. These default usernames and passwords are familiar to attackers. Hence, they should be renamed during the preliminary router loading. A strong password is one which is a mixture of letters and numbers and it should be set.

**2. Modify the default SSID-** A service set identifier (SSID) is an exclusive name that recognizes a specific wireless LAN (WLAN). All wireless devices on a WLAN must adopt the same SSID to interact with each other. Makers fix a default SSID that normally identifies the maker or the actual device. An attacker can make use of the default name to recognize the device and any loophole related to it. Users usually fix the SSID to their organization name, the location, their own name, etc. This enables the attacker to ascertain their specific business or home network depending on an SSID certainly associated with their name.

**3. Configure WPA2-AES for data concealment-** Wireless Equivalent Privacy (WEP) is a security rule created to offer data secrecy like authentication and encryption, but it has serious lapses. WEP was outdated by the 802.11 standard implemented as Wi-Fi Protected Access (WPA), which has a newer form, WPA2. WPA and WPA2 offer powerful authentication and encryption through certain keys. WPA and WPA2 is available in personal and professional versions.

**4. Restrict WLAN coverage-** LANs are innately more secure than WLANs because of the protection provided by the tangible structure in which they exist. WLAN coverage mostly extends beyond the boundaries of the home or organization. This paves way for spying by intruders outside the network limit. Therefore, restrict the broadcast coverage area when securing WLAN.

**5. Switch off the network when not operational-** The crucial point in wireless security measure is closing the network. This will undoubtedly shield the network from outside attackers from violating it. While it may be unfeasible to turn on and off the devices repeatedly, this approach can be adopted during travel or long offline time period.



6. **Deactivate UPnP**- Universal Plug and Play (UPnP) is a convenient feature that permits networked devices to effortlessly identify and launch interaction facilities with each other on the network. Though the UPnP feature simplifies initial network configuration, there is also a security threat. For example, malware within the network can break into the router to allow entry of intruders.

7. **Elevate firmware**- Just like software on computers, the router firmware, which is the software that controls it, must have latest updates and patches. Many of the updates take care of security issues that impacts the network.

8. **Use static IP addresses or restrict DHCP reserved addresses**- Most home routers are designed as Dynamic Host Configuration Protocol (DHCP) servers. Deactivating DHCP and redesigning clients physically is the most feasible alternative, but it may be unrealistic based on the extent of network and support staff.

9. **Deactivate remote management**- Deactivate to stop attackers from starting an association with the router and its configuration via the wide area network (WAN) interface.

10. **Disable remote upgrade**- This feature permits the router to work on the WAN interface for TFTP traffic which can affect the security of the router firmware. Therefore, best option is to deactivate it.

11. **Deactivate DMZ**- The router's demilitarized zone (DMZ) establishes an isolated network open to the internet. Disable this feature when not operating it.

12. **Disable redundant services**- As with any computer system, deactivate all redundant services in order to prevent the routers from getting exposed.

13. **Deactivate ping response**- The ping response feature is normally disabled by default. When this feature is activated, exploration on the router becomes hassle-free. It permits router to react to ping directions sent from the internet and may expose the network to attackers.

14. **Empower router firewall**- Most home routers have an in- built firewall feature. Make sure that this feature is enabled and meticulously designed to let only genuine users and services to connect to the network.

15. **Logging**- Activate router logging and periodically evaluate the logs for vital details regarding infringements, spying, attacks, etc.

16. **Observe the wireless traffic**- Always check the wireless traffic for any scrupulous network access by carrying out usual log analysis of the devices that have operated the router.

17. **Administrator workstations**- Ensure that any administrator workstation built for managing the router is on a reliable portion of the network to avert outsiders spying and gathering details about the network.

18. **Immobilise bridging and use network address translation (NAT)** - Home routers segregate the interior network from the internet by means of network address translation (NAT). NAT gives private IP addresses to every device connected on the network.

Some routers encompass a facility that lets them to function as a channel between two networks. This component can be operated for linking segments or devices on the same intranet to the internet via a routers routable IP address. Deactivate this feature when not operational, to prevent the threat to the router.

## 21. Governing for enterprise security

The previously unknown knack of security is now a compulsory and inevitable part of functioning of business. Governing for enterprise security means considering security as a non- negotiable obligation of business. If an organization's management does not set up and reinforce the business need for effective enterprise security, the organization's desired state of security will not be articulated, accomplished or continued. United States and European Union passed many laws in the last decade that mandate organizations to implement security measures. The Sarbanes-Oxley Act of 2002 mandates public companies to lay regulations for the accuracy of financial data. The Gramm-Leach-Bliley Act ensures that financial institutions protect customers' personal data. The Health Insurance Portability and Accountability Act (HIPAA) directs the medical industry to protect privacy of personal health care. The Federal Information Security Management Act ensures that agencies comply to security controls. To achieve a viable capability, organizations must ensure that enterprise security be a predominant concern of the leaders who are at a governance level, and should not be given to other organizational roles that lack the authority, accountability and means to act and impose compliance.

More than 30 U.S. state governments have issued laws that necessitate companies to openly confess any security gaps that result in the negligent revelation of state citizens' personal data. This is terrifying for those associated with a business. If a company reveals that have been irresponsible by losing its customers' data, its reputation could be tarnished and it could be unable to find new customers, its stock prices may fall and it could lose income and their current customers. These can be considered business issues rather than security issues. Probable risks to businesses are numerous ranging in impact from minor to tragic. Risks can be in the form of natural calamities, terrorism, power shut down, hackers, mischievous insiders, user faults, computer viruses, worms, internet malware, phishing emails and social engineering. Further, threats that are deliberately created rarely target IT systems in particular. However, they still face huge security repercussions. Because of its potential impact on various business functions, security is not the sole domain of the IT department alone. Security is a central competency for business frontrunners, who must now ensure smooth operation and continuity of business, despite all kinds of threats. This includes at least an overview of major security concerns. Thus forewarned, people in position will be better equipped to have productive discussions about how to safeguard business resources from internal and external attacks. These discussions might take place among the leaders who are in a variety of management roles.

Security threats and as well as its solutions are enterprise-wide. Leaders do not need to be experts who are proficient in every individual threat, but they do need a superficial knowledge of threat. Some efficient managers do impart an active and knowledgeable role in risk mitigation, working in collaboration with IT section and other departments to execute proactive

policies to safeguard sensitive data. Others may participate in security risk reduction in a more restricted way. Some managers may delegate risk mitigation to other personnel. Unfortunately, this is not how security concerns should be handled. Everyone in an organization, particularly top executives, must take responsibility for security. Because leaders are accountable for more critical judgments than most other employees, their obligation is even greater.

## 22. Safeguarding Home Network

Computer security is the process of averting and identifying illegitimate use of computer. We use computers for everything from making online payments for utilities, banking, investing, shopping, communicating with fellow users through email or for social networking programs. Although our communications are not top secret, we do not wish unknown people reading email, using our computer to attack others' systems, sending bogus email from our computer or investigating personal content stored on the computer particularly, financial statements.

Prevention steps help stop scrupulous elements from accessing computer system. Detection helps to find if there is an attempt to intrude into system. Intruders, also known as hackers, attackers or fraudsters will wish to gain control of computer in order to fuel assaults on other computer systems. Having control of computer helps them to make their true geographical location and identity invisible, as they launch attacks, mostly against high-profile computer systems. Intruders can track the users on the computer, create damage to computer by re-formatting the hard drive or alter the entire data. Unfortunately, intruders are constantly identifying new loopholes to exploit computer software. The intricacy of software makes it ever more challenging to systematically test the safety of computer systems. Also, some software applications have pre-set features that sanction other users to operate the computer unless the settings are altered for more protection.

To know more about security aids, let us understand a few terms. Firewall is a system or a combination of systems that establishes an access-restriction policy between two networks. In the home networks background, a firewall usually takes any one of two forms

- Software firewall - specific software running on an individual computer
- Network firewall - a dedicated device responsible for protecting one or more computers.

Both types of firewall encourage the user to outline access rules for incoming connections to the computers they are protecting. Some also provide the facility to control the kind of facilities the protected computers can access on the Internet. Most firewalls proposed for home use are available with pre-defined security guidelines from which the user can choose and customize the policies depending on their specific needs. There are numerous antivirus software packages that work in many ways. The similarity between them is that they all look for forms in the files or memory of the computer that specify the possible presence of a known virus. Antivirus packages know what to expect through the use of virus profiles. The efficacy of antivirus software is depended on getting the updated virus profiles installed on the computer so as to detect new viruses.

### 22.1 Computer security issues to home users

Information security is apprehensive about three attributes namely

- Confidentiality - information should not be available to wrong people
- Integrity – data should be edited only by those individuals who are sanctioned to do so
- Availability - information should be made available for access to those who need them

Some security threats arise from the likelihood of planned exploitation of computer by intruders using the Internet. Other risks are hard disk failures, theft, power shut downs, etc. The bad news is that it is impossible to be ready for every potential risk. The good news is that some simple steps can be adopted to reduce the chance of getting affected. The most common methods adopted by attackers to gain control of home computers are listed below.

- Trojan horse programs
- Behind the door and remote administration programs
- Rejection of service
- Being an arbitrator for another attack
- Unsafe Windows shares
- Mobile code (Java, JavaScript, and ActiveX)
- Cross-site scripting
- Email hoax
- Email-laden viruses
- Invisible file extensions
- Chat clients
- Packet sniffing

In addition to the risks related to connecting the computer to the Internet, there are a number of threats that the computer encounters even if it is not connected to network. Most of these risks are well known, however, it is important to understand suitable practices associated with minimising these risks. This may also help decrease vulnerability to the network-based threats.

**Disk failure-** Hard disk damages are the common cause of data damage on personal computers. Steady system backups are the lone viable option.

**Power failure and fluctuations-** Power problems like surges, blackouts and brown-outs can do physical harm to the computer, either by a hard disk crash or a damage to the electronic parts of the computer. Common modification method is to

use uninterruptible power supplies (UPS).

**Physical theft-** The act of stealing a computer results in the loss of privacy, integrity and availability of data. Regular system backup helps in recovering the data. But backups, by themselves, cannot guarantee confidentiality. Cryptographic tools are existent that can decode data embedded on a computer's hard disk.

### *22.2 Preventive Actions that home users can adopt to safeguard their computer systems*

The CERT/CC recommends the following actions to home users:

- Seek help from system support personnel when working from home
- Install virus protection software
- Load a firewall
- Do not open unknown email attachments
- Avoid running programs of unknown origin
- Deactivate invisible filename extensions
- Keep all applications, including the operating system, patched
- Switch off the computer or disconnect from the network when not required
- Disable Java, JavaScript and ActiveX if possible
- Deactivate scripting features in email programs
- Ensure there are regular backups of critical data
- Make a boot disk, in case, the computer gets damaged or affected

## **23. Identifying and Evading Email Scams**

Email is a useful and influential communication tool. Unfortunately, it is also a perfect instrument vulnerable to scammers and other malicious individuals to carry out activities for luring potential victims. The scams range between old-fashioned procedures to phishing schemes using an amalgamation of email and bogus web sites to coax victims into exposing delicate information. To avoid falling a prey to these scams, one should comprehend what they are, how they look, how they operate and ways to prevent them.

### *23.1 Identify email scams*

Email has made the game easy for scammers. The suitability and secrecy of email, enable to easily contact millions of people instantly, facilitating the scammers to work in bulk. Scammers need to trick only a small percentage of people they email, for their stunt to gain returns. The email scams have been in existence for a long time. In fact, most of them are merely reprocessed scams. It is easy to identify such bogus emails. The list of the most common types of email content are related to fake business opportunities, work from home options, health and fitness scams, fast money schemes, investment options, guaranteed loans and credit schemes. The discount offer scams contain mostly endorsements of cheap versions of expensive software and are unbelievable offers.

The advanced fee fraud schemes are quite detailed in nature and lure the victim into a fake plot to acquire huge amount of money. These scams are easily recognizable from the names and the subject line itself as they look like an African connection because most of these originate from those regions. Social engineering is an approach for soliciting sensitive information from people, which they normally would hesitate to disclose, or by prompting an action which people would not usually perform, by kindling their inquisitiveness or inclination to trust. Phishing emails are designed to resemble as if they have originated from an authentic organization. These emails attempt to trick people into visiting a fake web site, to either download malware or divulge sensitive personal information. The culprits of phishing scams meticulously design the bogus web site to look like a genuine one. The bogus site will look amazingly real and will present an online form seeking information like bank details, account number, address, online banking username and password, all the vital data an intruder requires to steal the identity and break-in to bank account. Bogus communications looks like they have been sent from banks, credit card companies, financial institutions and IT Department.

Trojan horse email offers the promise of something that people might be usually interested in, like an attachment enclosing a joke, an image or a patch for a software vulnerability. Once opened, however, the attachment performs the following actions. -create a security threat on computer and open a backdoor for illicit access, load software that records keystrokes and transfers the logs to an attacker, install software that observes and records online connections and activities, provide the connectivity to files, convert the computer into a "bot" which the attacker can operate to send spam, initiate attacks or spread the virus to other computers. Many viruses spread by scanning all email addresses on a corrupted computer and then mailing themselves to these addresses. The following suggestions can reduce the chances of becoming a victim of these scams.

**Filter spam-** Most email scams begin with unwelcome marketing email. Take steps to avert spam from getting into mailbox. Look into the help file for email application or service to understand what to do to filter spam.

**Do not entertain or trust unsolicited email-** Do not spontaneously trust any email sent by an unknown individual or organization. Always refrain from opening an attachment from unsolicited email. Most essentially, never click on a link sent in an email. Skilfully designed links can lead to bogus web sites set up to trick into revealing private information or downloading viruses, spyware and other malicious software. Spammers may also use a modus operandi in which they send unique links to each individual spam email. By tracking which links are asked for on their web servers, spammers can identify which email addresses are useable and are more likely to be target victims for repeat spam attempts. Be aware that even email received from a known address are risky. Many viruses transfer themselves by searching the target computer for email addresses and moving themselves to these addresses by disguising as an email from the user of the corrupted computer.

**Be cautious in dealing with email attachments-** Email attachments are widely utilised by online intruders to get a sneak-peek virus onto the computer. These viruses enable the scammer to get access to important information from the computer, infect the computer to enable it to be susceptible to additional attacks and abuse. This is then converted into a 'bot' for future use, attacks and other online crimes.

**Install antivirus software and keep it updated-** Always install antivirus software on the computer that has a programmed update option. This will ensure that there is the most up-to-date protection possible against viruses. In addition, ensure the antivirus software chosen encompasses an email scanning feature. This will protect computer from email-borne viruses.

**Load a personal firewall and keep it up dated-** A firewall may not be equipped to prevent scam email from entering into mailbox. But, it may help protect if a virus-bearing attachment is inadvertently opened. The firewall, also helps in preventing outbound movement from computer to the intruder. When personal firewall notices a suspicious outward communication from computer, it could indicate an infected program being installed on the computer.

**Configure email client for any potential threats-** There are a numerous ways to configure email users to make them less vulnerable to email scams. For example, organising email program to view email as "text only" will prevent scams that misuse HTML in email.

**Learn the Email Policies of the business partnering organisations-** Most organizations doing businesses via internet have laid out policies regarding communication with their customers in email. Many, for instance, will not demand account details or personal information via email. Familiarising with the policies of the organizations can help spot and avoid phishing scams. Always refrain from sending sensitive information via unencrypted email.

#### 24. Securing Your Web Browser

Nowadays, web browsers like Microsoft Internet Explorer, Mozilla Firefox and Apple Safari are loaded on almost every computer. Since the use of web browsers are so frequent, it is important to design them securely. Mostly, the web browser got along with an operating system is not installed in a safe default configuration. Insecure web browsers result in a variety of computer complications, including spyware being installed without the user's knowledge and intruders establishing their power over the computer.

Preferably, computer users should assess the issues from the software they operate. Many computers are bought with already loaded software. Irrespective of whether they are loaded by a computer manufacturer, operating system maker, Internet service provider or by a retailer, the foremost step in evaluating the susceptibility of computer is by identifying what software is loaded and the manner in which programs interact with each other. Unfortunately, an average user is ill-equipped to carry out such a detailed analysis.

Vulnerable web browsers are always prone to risks from attackers. It has been seen that new software weaknesses have been exploited and aimed at web browsers, through the use of compromised or malevolent websites. This problem is catapulted by some of the following factors.

- Users have the penchant for clicking on links without evaluating the consequences of their actions.
- Disguised web address that navigates to an unexpected site
- Web browsers being configured with less attention to safety features
- New security threats are often revealed after the software is designed and bundled by the manufacturer.
- Computer systems and software packages may be loaded with supplementary software, exposing to a number of susceptibilities
- Third-party software are not equipped for security updates.
- Many websites force users to activate certain features thereby exposing the computer to additional risk.
- Many users do not have knowledge to organise their web browsers safely.
- Many users are averse to enabling or deactivating utility as needed, to ensure security of their web browser.

##### 24.1 Web Browser Structures and Perils

It is imperative to apprehend the functionality and structures of the web browser. Installing many web browser options may risk security. Vendors mostly activate functions by default to advance the computing performance. But these functions result an increased risk to the computer. Attackers direct their efforts to misusing client-side systems, that is, user's computer, through various exposures. They make use of these vulnerabilities to overpower computer, steal data, damage files and use the same computer to attack other computers. Attacking web browsers is a low cost method adopted by attackers. An attacker can design a scrupulous web page that will load Trojan software or spyware to steal data. Instead of vigorously targeting and attacking compromised systems, a scrupulous website can inertly infect systems as and when the site is clicked. Another way is to send a malicious HTML document to victims. In such cases, the moment the email or attachment is opened, the system gets infected.

A few web browser features and allied risks are discussed.

**ActiveX** is a technology that Microsoft Internet Explorer operates on Microsoft Windows systems. ActiveX permits applications or portions of applications to be applied by the web browser. ActiveX has been inundated with various risks and execution issues. One main issue with using ActiveX in a web browser is that it enhances the risk surface. Loading any Windows application gives the chance of new ActiveX panels being loaded.

**Java** is an object-oriented programming which serves the purpose of developing active content for websites. Various implementations of the JVM contain risks that allow an applet to dodge these constraints.

**Plug-ins** are applications proposed for practice in the web browser. Plug-ins are identical to ActiveX controls but cannot be implemented separately from a web browser.

**Cookies** are files located on the device to stock data for precise websites. Cookies may contain browsing history or may even contain authorisations for operating the site. Cookies are useful for uniquely recognizing visitors of a website. If a website uses cookies for validation, then an attacker can gain illegal entry to that site by procuring the cookie.

**JavaScript**, also known as ECMAScript, is a scripting language that is capable of making websites more collaborative. There are guidelines in the JavaScript standard that limit specific features from operating local files.

**VBScript** has the credit of being one more scripting language that is distinctive to Microsoft Windows Internet Explorer. Though VBScript and JavaScript are alike, it is not popularly used in websites due to its incompatibility with other browsers. The facility to operate a scripting language like JavaScript or VBScript permits web page authors to augment a noteworthy number of features to a web page. However, this very facility can be misused by attackers.

#### 24.2 How to safeguard Your Web Browser

Some software dimensions that provide functionality to a web browser such as ActiveX, Java and Scripting may also present susceptibilities to the computer system. These susceptibilities may shoot from bad execution, poor design or an unprotected configuration. For these reasons, it is inevitable to recognize which browsers support each feature and the risks associated. Some web browsers allow full deactivation of these technologies, while others may allow f activation of these features on a per-site basis. Always visit the vendor's website of each browser and study about it. If a vendor hides the necessary details on securing the browser, contact the vendor and request for more details. Many web browsers can be loaded on the computer. Therefore, it is mandatory to safely restructure each web browser loaded on computer. One benefit of having numerous web browsers is that one browser can be utilised for secret and sensitive functions such as online banking, while the other can be used for normal web browsing. Operating on multiple browsers can leverage the chances of vulnerability in a particular web browser or website. Web browsers are periodically updated. So, depending on the type of the software, the dimensions and options may shift or alter.

#### 25. Recovering from a Trojan Horse or Virus

Given the widespread number of viruses and Trojan horses navigating the Internet at any specific moment, it is most important to take the most needed proactive measures to secure the computer system. Once the user finds out the specific virus that has harmed the computer, visit the concerned website and download an antivirus tool. The choices being limited because of being in oblivion, the user can adopt the given steps for securing the system and its files.

1. **Contact IT support-** contact The IT helpline and notify them as soon as possible and work based on their directions
2. **Cut off computer from the Internet-**Based on the type of Trojan horse or virus that has affected, intruders can also gain entry or view personal information and may even convert the computer into a bot to launch attack on other computers. This activity can be stopped by switching off the Internet connection. The ideal way to achieve this is to physically disable the cable or network connection or phone line.
3. **Back up all important files-** It is always advisable to have a stand-by or back up of required files. If possible, assemble all the required documents, images and files and write them onto a CD or DVD or transfer everything to another external storage device. Not to be forgotten, these files are not reliable since they are still potentially corrupt.
4. **Scan the machine-** Since the computer is loaded with a malicious program, it is best to scan the machine from a live CD instead of using an antivirus program installed in the past. Most antivirus products provide this feature. Another substitute is to make use of a web-based virus deletion service. After installing the software, take up a complete scan of the system. The first scan itself will, hopefully, erase the malicious files from the computer.
5. **Reinstall the operating system-** If scanning has failed to clean computer, the next feasible alternative is to format the hard drive and reload the operating system. Although this remedial action will lead to complete loss of all programs and files, it is the only alternative available to guarantee that computer is safe from intruder-amendments.
6. **Restore files-** once a backup of the files is made, it can be restored. Before placing the files back onto the computer, test them with anti-virus software to ensure that they are virus-free
7. **Protect the computer-** to safeguard the computer from future attacks, remember the following
  - Refrain from opening unknown attachments in email messages.
  - Never click or follow unsolicited links.
  - Have a latest anti-virus software installed
  - Use an Internet firewall.
  - Always secure web browser.
  - Keep the system patched.
  - Always be a responsible technology-user

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*Asian Social Science* wishes to acknowledge the following individuals for their assistance with peer review of manuscripts for this issue. Their help and contributions in maintaining the quality of the journal are greatly appreciated.

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