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A Total Communication Package for the Business Executives: Importance of Attitude, Culture, Leadership and Other Factors

Nargis Akhter[1], Sardana Islam Khan[2], & Nasrin Akter[3]

[1] Professor, Southeast Business School (SBS), Southeast University, Bangladesh

[2] Lecturer, School of Business and Law, Central Queensland University, Melbourne, Australia

[3] Assistant Manager - Human Resources, Merits Technologies Ltd, Bangladesh

Correspondence: Sardana Islam Khan, Lecturer, School of Business and Law, Central Queensland University, Melbourne, Australia.

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Abstract

Recent studies suggest that a series of contextually appropriate and effective communication training package is demanded by the employers and HR practitioners in the job market. However, the ways to design an effective, comprehensive and sustainable communication development program for the business executives have rarely been explored in the extant literature. This paper introduces the concept of a total communication package (TCP) that can help design a better communication development program for the business executives. This qualitative research uses the interview findings from 20 top executives from the banking and telecommunication sectors in Bangladesh to unpack the concept of TCP for the HR practitioners.

Keywords: communication skills, attitude, business executives, leadership, culture, Bangladesh

1. Introduction

Communication skill is one of the most important soft skills for the business executives according to the extant human resource management (HRM) literature (Akhter, Khan, & Hassan, 2009). However, the ways to design an effective communication training or development program for the business executives have rarely been explored. There is also a dearth of quality research on the nuances of communication skills in a developing country context where English is a second language but used as the primary mode of communication in business organizations. This paper introduces the concept of a total communication package (TCP) based on the findings from in-depth interviews with 20 business executives to unpack the complexity and unique demands on the communication training and development programs in Bangladesh.

This study is informed by two overarching research questions: (1) What communication related knowledge, skills, attitude, and other factors are considered important in the context of Bangladeshi business organizations and why? and, (2) How do these knowledge, skills, attitude, and other factors influence the communication outcomes of the business executives in Bangladesh?

2. Literature Review

2.1 Significance of Communication Skills in Business Organizations

Communication skills have been identified as one of the essential soft skills for business executives in the extant and seminal business and management literature (e.g., Katz1974; Kombarakaran et. al., 2008; Gerstein & Keisman 1983; Bennett & Olney 1986; Penley & others 1991; Aiken, Martin & Paolillo 1994; Clutterbuck & Hirst 2002; Datar, Garvin & Cullen 2011; Iksan et al. 2012; Akhter, Khan & Hassan 2009; Paksoy, Soyer & Çalik 2017; Smith 2017). Katz (1974) identified three basic skills for the business executives, i.e., technical, human, and conceptual skills, of which, human skill includes communication skill along with some other qualities. According to Penley and colleagues (1991), managerial performance essentially depends on communication skills. Based on a study on senior business executives, Aiken, Martin and Paolillo's (1994) study also marked communication as the most crucial skill for the business school graduates. Clutterbuck and Hirst (2002) identified communication as central to the four management competencies defined by Warren Bennis (management of attention, connotation, trust and self).

Kombarakaran and colleagues (2008) surveyed 114 executives and 42 coaches and found that executive coaching for leadership development encompasses five areas and 'dialogues and communication' was identified as one of these five areas. Gerstein and Reisman (1983) contended that senior managers need proper communication with peers, subordinates and superiors. Bennett and Olney (1986) conducted a study on executives from Fortune 500 companies which reflected that effective communication is vital for business success in the information society and is exceedingly important for the higher-level executive jobs. The study calls for especial attention of the academicians in developing pragmatic curricula of business communication courses and suggested sequential offerings of three courses on written, spoken and interpersonal communication and emphasized on the responsibility of the academics to convey the necessity of excellent communication skills for the students' success in executive jobs in the information society. Similarly, Katz (1974) suggested that academics should ensure the requisite communication skills for the students of 1980s for their future professional roles. Based on twenty-five studies in the previous ten years, Salvo (1980) contended that teachers should be aware about the requirement for particular communication skills for students as they will need these communication skills when they enter the job market.

In line with the earlier business communication literature, Iksan et al. (2012) also emphasized on the role of universities in creating graduates to address the job market demands. According to the authors, the universities should equip graduates to contest in the global job market and satisfy the employers' countless demands of soft skills and personality. The researchers emphasized on the inclusion of communication skills in the higher education course contents, the lecturer's feedback on students' communication and participation in various activities to help advance their communication skills for the future work life. Although the research was conducted on verbal (including listening), writing and social communication skills, the authors also emphasized on non- verbal communication skills, the importance of which remains under investigated till date especially in the context where English is the second language but used as the primary mode of communication in the office. In academia and professional training context as well, the non-verbal communication skills and other facilitators for effective communication are visibly underrepresented.

Akhter, Khan and Hassan (2009) found that the executives have positive attitudes towards the importance of communication course intended for executives. Most of the executive respondents completed communication course and they were dissatisfied with it. The respondents recommended compulsory communication training program in business organizations and suggested that academics should design and teach communication courses based on the employers' perspectives and requirements. Similarly, Paksoy, Soyer and Çalik (2017) argued that communication is a vital executive skill and manager-employee communication is critical for effective management. According to Smith (2017), communication is fundamental to the progress of both employees and business organizations and ineffective communication leads to loss of profit. The author identified trust, technology, face-to-face communication and smooth implementation of change through inclusive meetings as four important factors to ensure effective communication especially in health care sector. They argued that appropriate strategies to increase communication during change may help improve employee morale and profitability.

Robels (2012) study shows that out of 10 identified soft skills, business executives perceive communication, integrity and courtesy as the most important interpersonal skills for achievement. The research identified both hard and soft communication skills as equally important. Another study by Datar, Garvin and Cullen (2011) recommended business schools to go over the information, constructions, and theories included in the course contents and readjust their curricula to include communication skills, competence, and techniques. Based on the responses from deans and executives, the same study identified critical thinking and clear communication as two most important aspects of the eight required competencies.

Extant business communication and HR literature also emphasized on the importance of communication skills in non-managerial roles and technical experts in an organization. For example, Chohren (2015) mentioned that although employers consistently mentioned communication as one of the most cherished soft skills in business organizations, these skills are regrettably overlooked in the engineering discipline. The author contended that technical experts or professionals also need superior communication skills to effectively share research progress or objectives, effectually backup their company's product or service to a buyer, or to facilitate the buyer and peer training, which brings benefits to both engineers and employers.

2.2 Types and Contents of Communication Skills

Salvo (1980) revealed that the communication skills that were acknowledged for the most part were listening, written, oral, persuasive interpersonal skills, informational meetings and problem solving in small group. Cohn (2007) claimed effective listening to be a major requirement for effective communication. The researcher also argued that merely eight percent of communication is associated with topic, while the remaining relates to body language and tone of voice. Cohn (2007) also emphasized on the significance of considering communication as process, based on attitudes, knowledge, emotions, integrity from communicator's side and the receiver's diversity, emotions, attitudes, knowledge, integrity and so forth. Bambacas and Patrickson (2008) found that senior HR managers require the interpersonal skills such as precision and regularity of the message, the capacity to listen effectively and ability to lead in a collective way. Among these interpersonal skills, the methods of sending messages, particularly their precision and the leadership style that stimulated trust were given highest importance to boost the organizational commitment which was typically lacking.

Bambacas and Patrickson (2009) contended that even though communication skills such as interpersonal, speaking, listening and written skills are important for successful managerial performance, HR managers only evaluate these casually through managerial selections. The researchers suggested that HR staff must thoroughly examine their practices of the evaluation of communication skills of the candidates for managerial positions and provide training on communication skills after conducting effective training need assessment.

Majid et al., (2010) stated that the four crucial communication skills are reading, writing, listening and speaking. Hull (2012) emphasized that effective interpersonal communication does not refer to transmitting or attaining what was planned to achieve and rather requires the ability to construct and transmit proper replies, recognize and explicate creative, satisfactory answers, and inspire people to modification. It happens in functional verbal and nonverbal communications and through an environment which is favorable to fruitful communication. Bennett and Olney (1986) conducted a study by taking samples of executives from Fortune 500 companies. The common consent of the executives was that effective communication skills are vital for business success nowadays and will remain vital in future especially in an information society. The study revealed that communications skills are more important in the higher and peak positions in executive jobs.

Bennett and Olney (1986) emphasized on the impact of technological progress in the communication processes. The authors identified interpersonal, writing, and speaking as vital communication skills and lack of skills regarding precision, listening, brevity, speaking and analysis as the major communication problems. Gerstein and Keisman (1983) argued that senior managers need proper communication with peers, subordinates, superiors and others and the proper communication demands effective and efficient written material, formal presentation methods, verbal communication, listening, communication media, communication contents and so forth.

2.3 Roles of Leadership, Trust, Culture and Attitude in Effective Communication

Johnson and Bechler (1998) studied the link between listening efficacy and leadership emergence in the task-oriented small group. The study revealed that emergent leaders usually show more active listening skills than the other members. To be truly effective both leaders and managers must develop their self-awareness, become role model for communication in the organization and learn to encourage and manage constructive decent. An important part of the communication professional's role is to support the organization's leaders and managers in developing their communication competence. Luthra and Dahiya (2015) identified outstanding communication as an essential skill for an effective leader. Exceptional leaders know that a clear goal direction necessitates open, two-way communication and a trusting communication culture where one will treat another as friends and task partners. Extant literature suggested that functional communication demands two-way communications which may help to develop leadership and entrepreneurial skills among students (see Majid et al., 2010; Abbasi, Siddiqi, & Azim, 2011). Whitener et al., (1998) mentioned that credibility is linked to three communication features, i.e., accurate information, explanations for decisions and openness. Communication culture is the gum that holds teams and organizations united and this gum can be a motorist or a hurdle to performance (Decker & Mitchel, 2017).

2.4 Communication Outcomes: The Strategic Significance of Communication

Zerfass and Viertmann, (2017) argued that relating communication to business strategy is one of the key challenges for communication professionals. The 12 major values that can be attained through corporate communication can be allied to the four core corporate values. The researchers have recognized four major value propositions of communication which are facilitating operations, constructing intangibles, bending strategy, and confirming flexibility.

2.5 Role of Communication in Planning

Berger (1997) proposed that since communication, plans, and planning are related, communication discipline should include strategic social interaction which can contribute in planning. MacDonald (1976) also identified planning, mapping communication networks, recognizing communication-based roles and observing the characteristics of role occupants as important factors influencing the process of communication and outcomes.

2.6 Communication, Job Satisfaction, Employee Engagement and Citizenship Behaviour

Paksoy, Soyer and Çalik (2017) found a positive, bi-directional and moderate relationship between managerial communication skills and job satisfaction and job commitment and positive, bi-directional but weak relationship between job satisfaction and job commitment. The researchers advocated for increasing the number and level of training to improve communication skills among managers. Dasgupta, Suar and Singh (2013) revealed that assertive style of communication imparts highest sustenance to employees and perceived supervisory support at the workplace enhances employees' satisfaction with communication of supervisors and self-esteem. Employees' satisfaction regarding communication nurtures a resilient emotional connection with organizations which in turn declines employees' absenteeism, increase employee performance and commitment. The researchers suggest training program to mend assertive communication style among managers.

Kang and Sung (2017) found that internal communication management and employee engagement are linked, and employee engagement increases cooperation and minimizes the turnover intent. The researchers suggested that the organizations should implement a two-way, employee-centered symmetrical communication method in its daily communication management. Graen and Scandura (1987) argued that a mutually supportive relationship between managers and employees help increase dependability, cooperation, belief and innovativeness in the team. Firth et al. (2004) mentioned that supervisors' emotional care and self-esteem reconciled the effect of stressors on stress reactions, organizational commitment, job satisfaction and employee turnover. The researchers also emphasized on the relationship between supervisors and subordinates to decrease and cope up with stress. The significance of trustworthy and open communication culture between leader and member and role modeling of open communication by the managers were also highlighted by Cullen and Gordon (2014). Their findings revealed that nurse managers with effective leadership and communication skills helped enhance the organizational citizenship behaviors of the nursing team.

2.7 Language and Communication

Revell (2007) mentioned in his study that since people from different language and cultural background communicate for business purpose especially in meeting due to globalization and internationalization of trade, they frequently use English as an international language. Therefore, a person whose first language is not English is a challenge for them. This study focused on the use of English for International Business (EIB) at a particular business organization and extracted language issues, probable communication difficulties and frustrations that may exist in international contexts. The study also focused on the consciousness among some respondents to take strategies to beat these issues. Moreover, the author emphasized on the appropriate use of medium or mediums of communication, proper organization of the contents, language, non-verbal cues time, and place of communication. He also argued that a functional meeting is that meeting which is not arranged only for reporting information rather it can reinforce the team goals and spawned solutions. He mentioned that conflict is unavoidable but effective communication can help in eluding conflict and can reduce the magnitude of adverse effects when it arises.

Majid et al., (2010) attempted to explore the significance of communication skills in teaching, the social aspect, knowledge progression, and the implication of interpersonal interaction that relates to the students' emotional growth. Abbasi, Siddiqi, and Azim (2011) also contended that English language skill is vital for academic achievement since it has become an international language. The authors identified reading, writing, listening and speaking in English as crucial communication skills for the business executives especially in the non-English-speaking countries. The students with these crucial communication skills in English language have a better chance to be successful in academic and professional career as well.

2.8 Gender and Communication

Sistrunk and McDavid (1971) emphasized on the importance of cultural expectation of compliance and submissiveness in the female role as an important driver of group behavior. However, Markel, Long, and Saine's (1976) findings show that both male and female communicators speak more during the conversation when the listener is female. The findings also show that the average speech duration per utterance is expressively lengthier in case of female communicator. This was especially true in case of newly graduated female executives back in

mid 1970s which most likely implicates a transition in the male-female dynamics of communication dominance that may vary across cultural contexts.

2.9 The Impact of Globalization and Change in Technology in Communication

Groysberg and Slind (2012) argued that the effectiveness of managing by "command -and –control" and its complementary pattern of corporate communication has been abruptly lessened due to globalization and change in technology. The leaders can endorse the working flexibility, employee commitment and well fit strategic orientation by speaking with employees. Drussell (2012) found that although the respondents think that face-to-face communication is the most functional and desirable ways to communicate and the most functional and chosen means of communication and conflict resolution, they take part in daily social networking activities at a higher rate than face to face communication and they use face book and text message for communicating and conflict resolution. The researcher recommended further study to observe whether social networking is related to communication skills and resolution of conflict and whether it impacts interpersonal working. Walther and Valkenburg (2017) analyzed historical dispute about the necessity for integration in theorizing about communication processes. Besides, it argues for the possibility of communication technologies to associate mass and interpersonal communication in ways that avoid the old-style distinction between both types, and how collaborative communication technology provides unparalleled analytic methods for research.

2.10 Challenges in Developing Communication Capabilities among the Business Executives

Cameron and others (2013) studied the procedure by which junior researchers acquire scientific communication skills from their mentors, their feelings about the challenges, and the part of their mentors in the procedure. The findings show that trainees' development of scientific communication skills is taxing and a difficult process both for trainees and mentors. They found that perceptions varied considerably about who is responsible for ensuring that trainees develop scientific communication skills. Trainees recognize that their mentors require these skills. However, they sensed that their mentors did not persistently support them in cultivating these skills and some mentors even failed to provide social and emotional care during the practice. Even though some trainees were happy with their scientific communication skills, many expressed low levels of confidence. Mentors stated that their trainees were not adequately cognizant of the prominence of scientific communication skills, sometimes showed negative attitudes or were disinclined to pursue resources and displayed poor communication skills. Bambacas and Patrickson (2009) suggested that HR staff must thoroughly examine their candidates' communication skills especially for the managerial positions and provide appropriate training based on proper training need assessment (TNA).

3. Research Gap

Our analysis of business communication literature reveals that both soft and hard communication skills are central to the business executives' performance and the quality of university curricula plays an important role in developing those skills. However, many other factors such as leadership or mentorship, organizational culture and environment, and trust are some of the relatively under explored factors and actors especially in some developing country contexts where English is the second language but used as the primary mode of business communication. In such contexts, the hard communication skills such as speaking, writing, listening and reading in English language are likely to be more emphasized by the educators, trainers and business executives whereas some other important communication contents such as non-verbal communication, cultural intelligence and attitude are overlooked in the training and development programs. So, based on the review of extant communication literature, we have identified a wide range of communication skills required for the business executives as well as some other important factors that may influence the effectiveness of the communication process in a business organization (see Figure 1). We, therefore, argue that a comprehensive framework for the development of communication capabilities in business organization, especially in such contexts is required to achieve a broad range of sustainable communication outcomes and our study aims at proposing such a total communication package (TCP) for Bangladeshi business executives, HR managers, educators and trainers. The findings will be useful for the similar developing countries.

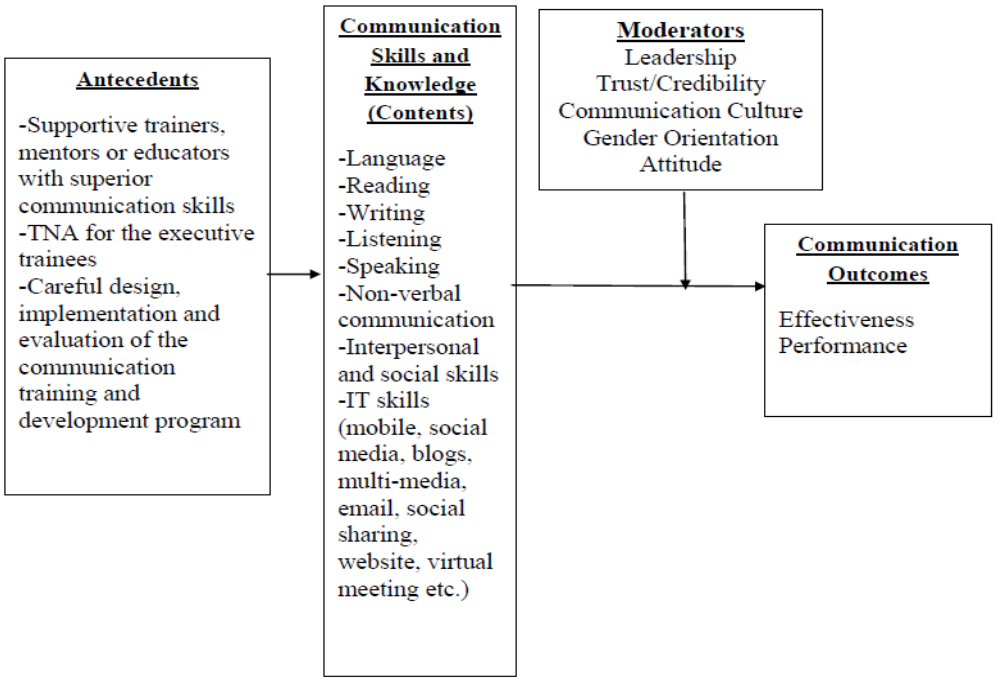

Figure 1. A Total Communication Package (TCP) for the Business Executives

4. Methodology

This qualitative research uses the data collected from 20 top executives from the banking and telecommunication sector in Bangladesh (see Table 1) to unpack the concept of TCP and recommends a sustainable communication capacity development framework for the HR practitioners. The respondents have more than 5 years of experience in the top-level executive positions with 2 or more employees currently working under their direct supervision, in a bank or telecommunication organization in Bangladesh. All selected respondents also hold at least a Masters level tertiary degree. The semi-structured interview agenda was designed around the communication knowledge, skills, attitudes and other factors. The voice recordings of these face to face interviews have been transcribed and then thematic approach has been used to analyze the data and identify the key themes. Two researchers have independently analyzed the data and corroborate the themes to ensure reliability.

Table 1. Respondents' Profile

Respondent (Label)	Industry	Designation and Department	Gender	Total Job Experience (years)	Number of Employees Under Direct Supervision	Highest Education/Academic Degree
1	Banking and Financial	Senior Vice President, Human Resources Management	Male	20 Years	17	EMBA Dhaka University
2	Banking and Financial	First Executive Officer, Clearing and Accounts	Female	10 Years	03	MBA
3	Banking	Vice President, Head, Consumer & sale	Male	23 Years	27	MBA & FCMA
4	Banking	Branch Manager	Male	13 years	17	MBA, IBA, Dhaka University
5	Banking	Deputy Manager, H/O	Male	08 Years	2	MBA (Finance),IBA, Dhaka University

6	Non-Banking Financial Institute	Assistant Manager, Human Resources	Male	06 Years	2	MBA, Dhaka University
7	Banking	Head of Branch Audit, ICCD	Male	18 Years	12	MBA (Marketing)
8	Banking	Senior Assistant Vice President, Consumer CRM	Male	15 Years	8	MBA (Banking & Insurance)
9	Banking	Branch Manager, FAVP	Male	14 Years	25	MSS, Dhaka University
10	Banking	First Assistant Vice President, Foreign Trade	Male	21 Years	9	MBA (Finance & Banking), IIUC
11	Banking	VP & Manager, Operations	Male	17 Years	35	ACBA, IBA
12	Banking	Officer, Credit Risk Mgt	Female	7 Years	10	10CMA (ICMAB)
13	Banking	First Assistant Vice President, Shariah Council Secretariat	Male	22 Years	8	MPhil, Aligarh Muslim University, Agra
14	Banking	Branch Operation Manager, Distribution Network	Male	11+ Years	35	MBA (Finance & Banking), IIUC
15	Telecommunication	General Manager, Process Excellence	Male	14+ Years	02	MBA, North South University
16	Telecommunication	Manager, Insight & Customer Experience	Male	15 years	2	MBA
17	Telecommunication	General Manager, Human Resources	Male	15 Years	8	MBA, North South University
18	Telecommunication	Lead Specialist	Male	15 Years	10	MBA, North South University
19	Telecommunication	Senior Specialist	Male	17 Years	7	MBA, North South University
20	Telecommunication	Head of Supply Chain Management	Male	22 Years	38	FCMA

5. Findings and Analysis

The findings of the study have been presented in four major sections around three major ‘a priori’ and ‘posteriori’ themes: (1) communication knowledge, skills and attitude (KSA); (2) other factors influencing the communication contents and process, and (3) communication outcomes. Some of the key agenda, probing questions, and major findings and themes from the responses have been presented in Table 2.

Table 2. Interview Agenda and Key Themes Emerging from the Findings

Key themes	Probing questions	Themes emerging from the response
Language	1. Does your organization give the highest importance on English language proficiency when the organization checks communication skills of candidates for executive jobs and take decisions regarding the promotion of executives?	Includes both affirmative and negative responses with more organisations acknowledging the English language skill as one of the most essential communication skills.
Knowledge	2. Do you think knowledge of the communication process and intended outcome is important in developing the communication capacity in an organization? Explain 3. How do you think this knowledge of communication process and outcome can be developed or improved? 4. Do current education programs ensure these knowledge outcomes? Why or why not?	-Most respondents believed a comprehensive knowledge of the communication process is important. -Effective Business Communication Course at Undergraduate and Graduate Levels (One for each). -Three (03) courses should be covered on business communication which are written, spoken and nonverbal. -Current education programs do not always ensure the knowledge outcomes required by the organizations. -Besides Business Communication Courses, faculty members' initiatives to improve communication knowledge of the students in other courses is imperative.
Skill	5. What communication skills are important in your day to day operations?	Speaking, Listening, Reading, Writing, Non-verbal Communication (eye contact, facial expressions, gestures, posture, body orientation, body language, space and distance, proximity, para-linguistic, etc.)
	6. How can these skills be best developed?	-Speaking, viva-voce, teamwork, role play, debate, report writing and presentation -Using different modes of assessment such as in others courses public speaking, viva-voce, teamwork, role play, debate, report writing and presentation in other courses - Communication Skills Training - Mentoring by direct supervisor - Team work - Role Modeling by direct supervisor - Role Modeling by CEO - Incentives for Best Communicators
	7. Do current programs ensure these outcomes? Why or why not?	Responses are predominantly negative. The major reasons included lack of knowledge and informed pro-active TNA and training evaluation
Attitude	8. What kind of attitude is important for effective communication in an organization?	-Communication Skill is the most important skills for executives for doing job effectively and efficiently. -We should take appropriate measures to develop excellent communication skills of ours and our executives. Communication Skills of employees have strategic significance.
	9. What kind of attitude is important for a participant in communication training and development programs? 10. Do current development programs ensure these outcomes? Why or why not?	-Communication Skill is the most important skills for executives for doing job effectively and efficiently - Since training provides an opportunity to learn, if we try to learn sincerely from training on communication, we will be able to develop knowledge and skills regarding communication. -Current programs do not focus on attitude
Organizational Culture	11. Do you think organizational culture is important in effective communication? 12. What type of culture is congenial to ensure effective communication in an organization?	-All participants responded affirmatively. -Trust among organization members regarding each other otherwise information will be distorted during communication -Incentives for executives for excellent

		knowledge, skills & attitudes (KSAs) towards communication -Executives' confidence regarding employers' commitment to provide incentives for excellent knowledge, skills & attitudes (KSAs) towards communication -Role Modeling by direct supervisor Mentoring by direct supervisor -Role Modeling by CEO -Allocating required budget for communication training -Required Leave for Educational Program to improve communication skills.
	13. Do you think leaders in organizations can facilitate or enhance the outcomes of communication training or development programs? If yes, how?	-Allocating required budget for communication Skills Training -Ensuring effective training process on communication skills Required leave for education to improve communication skills -Ensuring required return on investment (ROI) from Communication Training -Role Modeling by direct supervisor regarding communication skills -Mentoring by direct supervisor regarding communication skills -Role Modeling by leader regarding communication skills Incentives for executives for excellent knowledge, skills and attitudes (KSAs) towards communication. -Executives' confidence regarding employers' commitment to provide incentives for excellent knowledge, skills & attitudes (KSAs) towards communication -Trust among organization members regarding each other; otherwise information will be distorted during communication -Continual Evaluation of executives' communication skills & take further decision on the basis of it.
Other factors	14. What other internal or external factors and actors are important to ensure and sustain the outcomes of communication trainings and capacity building programs? 15.Do you think emotional and cultural intelligence is important for effective communication? Explain.	Many other factors such as emotional and cultural intelligence have been identified.
Communication outcomes	16. How do you measure the outcomes of effective communication? 17. How do you measure the outcome of a communication skill development program? 18. What other factors (apart from the merit of the training or development programs) may contribute in achieving those outcomes? 19. Do you think that executives' communication skills have influence on organizations' strategic achievements? How?	The respondents generally expressed dissatisfaction about the evaluation process and criteria of evaluation. Many other factors such as competence of the trainer has been identified as the deterrent. The findings predominantly show that communication skills of the executives often directly contribute to the achievement of organisational outcomes and development process (OD).

5.1 Communication KSA

All respondents agreed that the knowledge of the communication process and intended outcomes are as important as the skills in developing the communication capacity in an organization which is currently lacking. They identified the knowledge about the effective communication process and intended outcomes vital for the continuous and future improvement of communication skills and capacity building. For example, respondent 1 stated,

"Without knowledge it is not possible to develop skills and both personnel and organization will suffer in the completive market to survive and to get result from their performance as well as to achieve their goals".

Similarly, respondent 8 stated,

"Firstly, knowledge is a vital matter to develop skills. Without proper knowledge there is no chance to get expected performance from them. If knowledge is not appropriate there is chance of misguidance to get result from the performance of the employees".

Respondent 10 emphasized on the link between the knowledge of the communication process and outcomes and the organizational performance in the following statement,

"As human are social beings, in every step of our life we need communication skill to build up public relationship which is mostly important in the business sector to provide excellent customer service. If there is a gap between knowledge of communication and the value of outcomes, the right information cannot be expressed properly to the customers, the stakeholders and the clients. Knowledge of such sort would educate the employees to further enhance their required communications skills".

The respondents also acknowledged the importance of communication skill as *"the major criteria for career development especially in the service industries. It is very important for an employee to be a good communicator in every aspect. Without the capacity of communication, an employee cannot be succeeded in his or her career at all"* (R-2). Many respondents identified the importance of communication capacity as crucial *"for multinational companies which have multidimensional people from different countries"* (R4).

5.1.1 Role of Academia

In response to the question about whether the current education programs ensure the required communication knowledge in Bangladesh only 7 out of 20 respondents answered affirmatively, while majority (12 respondents) said that the current academic curricula fail to effectively address the job market's demand for communication knowledge and capability and one respondent was uncertain about the condition. Those who responded affirmatively mainly expressed their satisfaction with the communication capabilities of a few leading universities in Bangladesh for including different types of creative writing and speaking through different courses both at the undergraduate and post-graduate level which help student to enrich their knowledge. For example, R 18 said,

"Communication process, attitude and behavior of the interns and new employees can be measured through their performance and represent the outcomes of their knowledge. Therefore, it can be said that current education programs ensure these knowledge outcomes. They are getting opportunity to achieve knowledge through these education processes especially in some specific universities such as Dhaka University, North South University, BRAC University and East West University".

Many respondents mentioned that the students in Bangladesh focus more on securing a better grade rather than developing their communication capabilities or building knowledge. R-15 stated, "*the students are CGPA oriented; they only focus on how to get more CGPA without learning and acquiring knowledge now a days. The presence of participatory approach is at highly dissatisfactory level". O*thers suggested that communication skills should be the focus of the school curricula as well to gradually build up the communication capabilities. Some of the respondents emphasized on developing English language skills. For example, R-13 stated,

"I do not know about the education process, but BBA & MBA Programs cover communication courses so that the students get the basic knowledge of communication skills. But actually, communication skills must be developed from childhood. Except English medium schools, most of Bangla medium schools do not cover the course regarding communication skills. Communication skill development related courses should be included from schools".

Other respondents highlighted the importance of extracurricular activities as an important way to develop communication skills and capabilities. R-16 said, *"so, we have to focus on or enhance involvement and engagement by giving opportunity to the students by participating debate, club activities and like besides the regular studies".*

Many respondents appreciated the syllabus and curricula but criticized the teaching method and evaluation process which in their opinion, do not ensure the outcomes of the knowledge. They expressed that there is a gap between the education programs and environment of the institutes. Some respondents suggested that there is a need to develop the structure of evaluation process and teaching method in the current education system. More practical knowledge and industrial practices should be added with the education and teaching method through presentation, case studies, industry visits, training session, seminars and job fair to enhance the students' practical knowledge as opposed to only theoretical contents to enhance their communication outcomes which will also help shape their future career path according to the respondents. For example, R7 stated, *"there is a gap*

between education programs and industrial sector. They should ensure the involvement of the industry person to develop their education programs as well as curricula and syllabus based on practical work experience".

Similarly, R-10 said, *"current education programs are not enough. The class session also should be taken by the educational expert in every semester to give a clear concept about the practical knowledge about the industry"*. R-8 emphasized on the use of state-of-the-art educational instruments and digital platform in the classroom which will help teach students the effective use of digital technology to enhance their communication capabilities for the future career growth. The respondent also believes that the teacher or the trainers are not well equipped or trained up for such kind of education.

5.1.2 Role of Organizations

In response to the question about the current system or opportunities provided by the organization to the business executives, 14 respondents answered affirmatively while the rest stated that no well-planned or focused development programs are in place in their organizations.Those who responded positively stated that they are getting the opportunity to develop communication skills and build up relationship by creating network and connectivity and creating business connectivity increases opportunity for further career growth as well which is a desirable outcome from the enhanced capability. R-10 stated that his organization has its own communication policy and code of conduct for communication. They also receive mentoring by the supervisor which helps them find out the knowledge and skills gap and through training they can address those gaps. Some other respondents mentioned that they have a post training evaluation process in place and trainees must present their training modules to other employees to share knowledge.

R-14 stated that "business executives often present their ideas in front of large audiences which ultimately develop their communication skills. Management also organizes different kind of communication courses and training to improve employees' presentation and public speaking skills through teamwork, role modeling and training courses".

5.1.3 Knowledge and Proficiency in Using Digital Platform

Many respondents identified the effective use of digital platforms as one of the most important communication skills in the current job market. R-11 stated that the communication process in his organization involves extensive use of digital platforms such as LinkedIn, Zoom, Microsoft team or WhatsApp for internal and external communication. Data management skills also help enhance the communication outcomes in according to some respondents.

5.1.4 Importance of Attitude in Effective Communication

Many respondents mentioned that both the managers and employees should sincerely acknowledge the importance of developing communication capabilities to ensure individual and organizational performance. Such awareness will help the managers for better designing and evaluating the communication training and development programs based on proper TNA. The business executives attending those trainings will also need to have a positive attitude towards these training or development programs and the importance of improving their communication knowledge and skills. Some respondents highlighted the positive learning spirits and cultural adaptability as two vital aspects of the positive communication attitude in the workplace and they associated prior academic institutional affiliation to such attitudes. For example, R-16 said, "*our employees have adaptability to adjust to their organization's culture. As per my observation, employees who had come from mostly Dhaka University, North South University, American International University-Bangladesh, Independent University, Bangladesh, BRAC and East West University have positive attitudes to adapt and support the responsibilities of their job to handle it smartly*". Apart from Dhaka University (only public university mentioned), most of the other universities mentioned by the respondents are among the top five private universities in Bangladesh. Some respondents have also emphasized on the importance of emotional and cultural intelligence of the business executives in ensuring the desired outcomes from superior communication knowledge and skills.

The respondents have explained how a positive attitude may the continuous and effective development of the communication soft skills of business executives. The executives with the right learning attitude and self-awareness are able to assess their own communication skill gap and compare their own skill with other. They can identify and follow an appropriate role model among their colleagues or superiors and easily align or adapt to the organization's culture. Such employees can also find free training and courses which are online based and easily accessible on their own and based on their own initiative and TNA. R-13 mentioned that an executive with cultural intelligence can learn by himself to cope up with multinational culture, have better

adaptability to cope up with the changing system and work better in a team. "*There are lots of learning opportunities other than formal training conducted by organization and an employee with the right learning attitude usually grabs those opportunities to improve their skills"* (R-9). The respondents also emphasized on the usefulness of emotional intelligence in breaking ice and understanding and demonstrating the appropriate emotion in the work environment which in turn may help create a trusted relationship and a positive communication culture in the organization.

5.2 Other Factors Influencing the Communication Contents and Process

Many respondents attributed the environment or culture and work system in their organization as important contributors to the effective communication outcomes. R-16 stated that their organization created and facilitated an effective communication culture, *"through learning and development programs, training, brain storming, job rotation, presentations in meetings, public speaking and town hall presentation so forth".* They also provide other opportunities such as internal and external training on communication, teamwork and mentoring. Many respondents emphasized on maintaining an open, supportive and trusted environment in the organization to facilitate continuous evaluation and improvement of communication capabilities.

5.2.1 Role of HR Department

The HR Managers informed the researchers about their role and initiative to improve employees' communication KSA. R-15 said, *"every year our organization allocates budget for developing communication KSA of employees which is 20 percent of the total budget"*. The organization provides training and other financial support to develop required skills for doing the job properly after doing Training Need Assessment. Renowned Trainers from organizations such as British Council or BDjobs.com are invited to provide these trainings. Another HR manager R-3 stated that *"we got suggestion from the trainer that there should be a strategic unit for communication skill development- meaning an individual department which may have separate identity to ensure greater impact".* Some HR managers stated that their department develops awareness about importance of effective communication among the business executives through the orientation programs to develop the right attitude from the get-go.

5.2.2 Role of Leadership

The respondents invariably emphasized on the importance of a leader's role in mentorship, role modeling and creating the right attitude about the content and process of communication among the employees. According to the respondents a good leader must build up trusted relationship with the peers and a supportive organizational culture to develop and sustain the communication KSA in their organization. They must allow sufficient budget allocation for employee development programs and arrange for regular presentation and public speaking opportunities which will help employees to continuously improve their communication skills and apply the learning from their trainings. Leaders and HR department should systematically evaluate executives and offer proper incentives to the best performer who have good communication skills and positive learning attitudes.

The leaders should also offer active mentorship to the business executives by being a role model, observing the regular activities of the executives and providing timely and appropriate feedback to improve their communication skills and outcomes. They should also create awareness among the employees about the importance of improving their communication skills to survive in the competitive market. The leaders and HR must also collect and use the feedback from the executives about the communication training and development programs and how to improve these programs.

5.3 Communication Outcomes

Most respondents mentioned that the identification or selection of desired and appropriate communication outcomes is very important in designing and evaluating the effectiveness of a communication KSA development program. However, the current systems predominantly focus on the superficial criteria for such evaluation or assess only the immediate outcomes such as improvement in the fluency of speech and so forth. The respondents emphasized on finding ways to improve the total communication package by evaluating the whole system and process of communication and not only the contents of it. Most respondents also believed that the current evaluation process overlooks or fails to capture the ultimate impact of apparently improved communication skills among the business executives mainly because the improvement in organizational outcomes are rarely measured in relation to the improvement of the contents (skills) and process (system and environment) of communication. There is currently no tool in place to measure the improvement of communication culture or environment or attitude according to the respondents.

6. Discussions and Conclusion

Our findings largely corroborated with the extant and seminal business communication literature in emphasising on both the soft and hard skills of communication and its importance on the performance of business executives. Our respondents also acknowledged the important but deficient role of tertiary education system and curriculum in Bangladesh in developing the soft and hard communication skills. The English language (see Revell, 2007) and IT skills (see Groysberg & Slind, 2012, Drussell 2012; Walther & Valkenburg, 2017) have been identified as the most important hard communication skills in business organisations in Bangladesh. In line with the findings of Johnson and Bechler (1998), Luthra and Dahiya (2015) and Decker and Mitchel (2017) Whitener et al. (1998), our respondents also recognised trust, leadership, organisational culture and environment as important factors influencing the communication process. Our findings did not reveal any gendered issues influencing the process or outcome of communication. Our respondents were predominantly male which may have influenced the lack of insights into gender differences in the communication process and outcomes. A more extensive future research may explore this issue.

An important revelation from our findings is that most respondents viewed communication as a complex process and not just a set of skills with immediate individual performance outcomes. Effective communication is also generally viewed by our respondents as an organisational capability that must be sustained and nurtured in the culture to ensure greater and sustainable strategic outcomes as opposed to just an individual level skill, which is similar to Zerfass and Viertmann's, (2017) theory. Based on our 'a priori' and 'posteriori' themes, we proposed a total communication package for the business executives (see Figure 1) that can be used by the Bangladeshi business organizations and HR experts to develop sustainable and strategic communication capabilities within their respective organization. This TCP model may also be used by the future business communication researchers to design a more extensive qualitative or quantitative research to measure or compare the effectiveness of the communication process in different contexts.

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The Impact of Covid-19 Spread on Stock Markets: The Case of the GCC Countries

Nader Alber[1], & Amr Saleh[2]

[1] Professor of Finance, Ain Shams University, Cairo, Egypt

[2] Associate Professor of Economics Ain Shams University, Cairo, Egypt

Correspondence: Nader Alber, Ain Shams University, Cairo, Egypt.

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Abstract

This paper attempts to investigate the effects of 2020 Covid-19 world-wide spread on stock markets of GCC countries. Coronavirus spread has been measured by cumulative cases, new cases, cumulative deaths and new deaths. Coronavirus spread has been measured by numbers per million of population, while stock market return is measured by Δ in stock market index.

Papers conducted in this topic tend to analyze Coronavirus spread in the highly infected countries and focus on the developed stock markets. Countries with low level of infection that have emerging financial markets seem to be less attractive to scholars concerning with Coronavirus spread on stock markets. This is why we try to investigate the GCC stock markets reaction to Covid-19 spread.

Findings show that there are significant differences among stock market indices during the research period. Besides, stock market returns seem to be sensitive to Coronavirus new deaths. Moreover, this has been confirmed for March without any evidence about these effects during April and May 2020.

Keywords: Coronavirus, COVID-19, stock market return, GMM technique, panel analysis

1. Introduction

The 20th century witnessed two pandemics since the historic *Spanish Influenza* of 1918, the *Asian flu* of 1957 and the *Hong Kong flu* of 1968. The 21st century has seen four pandemic outbreaks: bird flu (*N1H1*) in 2009, Severe Acute Respiratory Syndrome (*SARS*) in 2002, Middle East Respiratory Syndrome (*MERS*) in 2012, and *Ebola* in 2013 (Baldwin & Weder di Mauro, 2020, p. 5).

Usually, global financial crisis plays out in countries across the globe and consequently manifests in four overlapping phases. Although each phase has a policy focus, each phase of the crisis affects the others, and, until the crisis has passed, no phase seems to have a clear end point. Nanto (2009) summarized the four phases of the global financial crisis as follows: contain the contagion and strengthen financial sectors; coping with macroeconomic effects; regulatory and financial market reform and dealing with political, social, and security effects. Orlweski (2008) identifies five distinctive stages of the current global financial crisis as follows: the outbreak of the subprime mortgage crisis; the proliferation of credit risk, with the broadening of losses of financial institutions; the eruption of liquidity crisis; the commodity price bubble and the ultimate freeze of credit markets.

When it comes to COVID- 19, it's important to consider not only the characteristics of financial crisis, but also the economic shocks, where poverty kills poor people, but the outbreak of COVID-19 has another story. McKibbin & Fernando (2020) shows that if diseases are generated in poor countries due to overcrowding, poor public health and interaction with wild animals, they can kill people of any socioeconomic group in any society. Unfortunately, politicians continue to ignore the needs of investment in public health and development and the scientific evidence on the role of public health in improving the quality of life and as a driver of economic growth.

Coronavirus spread has been increased during the research period in all of the GCC countries, where Saudi Arabia has recorded the highest indicators and Bahrain has registered the lowest ones (https://www.worldometers.info/coronavirus).

Figure (1) shows the developments of GCC stock markets' indices, as follows:

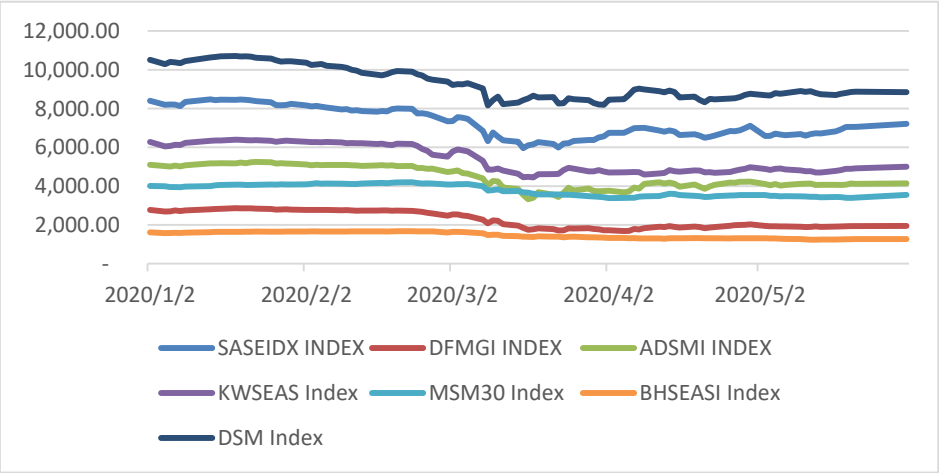

Figure 1. Development of GCC Stock Markets' Indices

Figure (1) shows that stock market returns tend to be decreasing during March 2020 and seem to be flattened during April and May. This paper tries to explain the behavior of stock market returns due to Coronavirus spread indicators.

This paper addresses a main question about the stock market reaction to Coronavirus spread. This has been applied on the Gulf Cooperation Council (GCC) countries, on daily basis over the period from March 1, 2020 till May 31, 2020. So, this paper tries to address the following questions:

1- Are there significant differences among stock market indicators during months of Coronavirus spread compared with the earlier months.

2- Does Coronavirus spared affect stock market return?

After this introduction, section 2 illustrates the related literature. Section 3 explains how to develop hypotheses and measure variables. Section 4 presents descriptive and diagnostic statistics. Section 5 is for testing hypotheses and section 6 is for robustness checks. Section 7 summarizes the paper and provides remarks about conclusions.

2. Literature Review

This section tries to present some of previous work, which has been conducted in the field of stock market reaction to the positive or negative informational contents, especially to the announcement about Coronavirus spread. Besides, it covers some recent papers about Coronavirus economic effects.

Stock markets seem to be sensitive to bad news and this sensitivity may differ according to countries and industries, where Alber (2013a) supports the effects of "industry effect" on stock market reaction to global financial crisis in Egyptian, Kuwaiti, American and British stock markets during the period from 2007 to 2011. Besides, Saleh (2017) shows that the factors of fears and hesitation to startup an investment is one of the most important factor that brings entrepreneurs to fail in their investments, comparing with the institutional or individual investors in the stock market, where the brokers absorb the psychological fears and chocks.

On the other hand, good news may affect stock market returns, where Alber (2013b) addresses the effects of quality announcement on performance Egyptian listed companies. This has been conducted using a sample of 11 events, covering announcements of international and national quality accreditation during the period from 2006 to 2012. Using event study methodology, results indicate that, hypotheses regarding the significance of differences between ARs and CARs could be accepted. Another study by Alber (2020a) attempts to investigate the effects of Coronavirus spread on stock markets of the worst 6 countries over the period from March 1, 2020 till April 10, 2020. Results indicate that stock market return seems to be sensitive to Coronavirus cumulative cases. Besides, robustness check confirms these effects for China, France, Germany and Spain. However, these effects haven't been confirmed for Italy and United States. Using the same indicators of Coronavirus spread in Belgium, France, Germany, Italy, Netherlands Spain and UK, Alber (2020b) has NOT supported the anticipated effects during the period from Febreuary15, 2020 till May 24, 2020 on daily basis. After splitting the research

period into 7 sub-periods (2-weeks each), results indicate that abnormal return of stock market seems to be sensitive to Coronavirus cumulative cases. This has been applied using panel analysis according to GMM technique.

Yan (2020) examines how COVID-19 affects Chinese stock markets from January 20, 2020 till April 7, 2020. The results show that the coronavirus leads the stock prices to fall sharply. Other studies have been conducted to assess the effects of Coronavirus spread globally, where Rehan, Alvi, & Karaca (2020) checks the short term stress of COVID-19 on the American, European, Asian, and Pacific stock market indices, using data of 41 stock exchange from 32 countries from 1st July 2019 to 14th May 2020. Results show that there is a significant negative relationship between the number of COVID-19 cases and the stock indices. Besides, Liu, Manzoor, Wang, Zhang & Manzoor (2020) indicates that there is a negative relationship between the increase in the number of cases and stock indices return of 21 major stock indices. Findings show that Asian countries are more affected than the other regions.

Many papers focus on market reaction to Coronavirus spread in terms of "industry effect", where Mazur, Dang & Vega (2020) investigates the US stock market performance during the crash of March 2020 triggered by COVID-19, using the Standard and Poor's 1,500 firms during March 2020. Finding show that natural gas, food, healthcare, and software stocks earn high positive returns, whereas equity values in petroleum, real estate, entertainment, and hospitality sectors fall dramatically. Moreover, Yan, Stuart, Tu & Zhang (2020) indicates that shorting travel stocks, entertainment stocks, and certain technology stocks, are likely ways to make short term profit due to the short-term panic selloff caused by the coronavirus outbreak. The study suggests purchasing a gold ETF because gold performs well in volatile markets and predicts that because the market is still volatile, there is still room for the price of stocks to keep decreasing. Besides, Kandil Goker, Eren, & Karaca (2020) investigates impact of the COVID-19 outbreak on the Borsa Istanbul sector index returns. This study reveals the impact of the pandemic on sector basis. The data of 26 sectors in BIST are analyzed by the event study. Results indicate that most of the sectors have negative cumulative abnormal returns and the highest lost is found in the Sports, Tourism and Transportation sectors.

Regarding economic effects of Coronavirus spread, McKibbin & Fernando (2020) has presented some preliminary estimates of the cost of the COVID-19 outbreak under seven different scenarios of how the disease might evolve. In the short term, central banks and Treasuries need to make sure that disrupted economies continue to function while the disease outbreak continues. The longer-term responses are even more important. Besides, Gormsen & Koijen (2020) tries to quantify how investors' expectations about economic growth across horizons evolve in response to the coronavirus outbreak and subsequent policy responses. As of March 25, the forecast of annual growth in dividends is down 28% in the US and 22% in the EU, while their forecast of GDP growth is down by 2.2% in the US and 2.8% in the EU.

Comparing with literature, it's important to pinpoint that it considers not only both of infection and death indicators, but also, both of cumulative and new ones. Moreover, Coronavirus spread has been measured relatively, where all measures are adjusted per million of country population. Besides, this study focuses on GCC countries, while many studies concern with the US, China and Europe.

3. Measuring Variables and Developing Hypotheses

Coronavirus spread has been measured by "Cumulative Coronavirus Cases" (CCC), "Cumulative Coronavirus Deaths" (CCD), "New Coronavirus Cases" (NCC) and "New Coronavirus Deaths" (NCD), on daily basis, in terms of country population. Stock market return is measured by Δ in stock market index. Data about Coronavirus are obtained from: https://www.worldometers.info/coronavirus and research variables are calculated as follows:

$$\mathbf{SMR = \Delta \text{ of market index m at the end of day n}} \quad (1)$$

$$\mathbf{CCC = Ln \text{ of Cumulative Coronavirus Cases (per million of population)}} \quad (2)$$

$$\mathbf{CCD = Ln \text{ of Cumulative Coronavirus Deaths (per million of population)}} \quad (3)$$

$$\mathbf{NCC = Ln \text{ of New Coronavirus Cases (per million of population)}} \quad (4)$$

$$\mathbf{NCD = Ln \text{ of New Coronavirus Deaths (per million of population)}} \quad (5)$$

This paper aims at testing the following two hypotheses:

1- There's no significant differences among stock market indicators during months of Coronavirus spread compared with the earlier months.

2- There's no significant effect of "Coronavirus spread" on "stock market return".

Regarding the first hypothesis, *Wilcoxon Signed Rank* test has been conducted to investigate the significance of differences among stock market indicators during March, April and May 2020 compared with the January and February 2020.

Regarding the second hypothesis, we consider the alternative hypothesis Ha: β # 0 versus null hypothesis Hb: β = 0, where β is the regression coefficient of the following functions:

$$\mathbf{SMR = \alpha + \beta\ CCC + \varepsilon} \quad \mathbf{(6)}$$

$$\mathbf{SMR = \alpha + \beta\ NCC + \varepsilon} \quad \mathbf{(7)}$$

$$\mathbf{SMR = \alpha + \beta\ CCD + \varepsilon} \quad \mathbf{(8)}$$

$$\mathbf{SMR = \alpha + \beta\ NCD + \varepsilon} \quad \mathbf{(9)}$$

All of the Coronavirus indicators are positively correlated and this is why we test their effects separately to avoid the problem of multicollinearity.

4. Descriptive and Diagnostic Statistics

The first COVID-19 cases in Europe were reported in UAE, on February 15, 2020, and the first death was in Bahrain on March 16, 2020. Tables (2) illustrates the information of the research sample that includes 7 stock markets, over the period from March 1, 2020 till May 31, 2020 as follows:

Table 1. Sample information

Country	Stock index
Saudi Arabia	Tadawul All Share Index (SASEIDX)
UAE (Dubai)	Dubai Financial Market General Index (DFMGI)
UAE (Abu Dhabi)	Abu Dhabi Securities Market General Index (ADSMI)
Kuwait	Kuwait Stock Exchange Index (KWSEAS)
Oman	Muscat Securities MSM 30 Index (MSM30)
Bahrain	Bahrain Bourse All Share Index (BHSEASI)
Qatar	Qatar Exchange Index (formerly DSM20 Index)

Tables (2) illustrates descriptive statistics of the research variables during the research period and table (3) indicates the correlation coefficients as follows:

Table 2. Descriptive statistics of research variables

Variables	SMR	CCC	CCD	NCC	NCD
Mean	0.002817	6.646677	1.545638	3.795369	-1.103376
Median	0.002711	6.821536	1.665298	3.927035	-1.192953
Maximum	0.063835	9.891070	3.904839	6.349162	0.850838
Minimum	-0.074136	3.092471	-3.550016	0.934410	-3.550016
Std. Dev.	0.018168	1.304635	1.321451	1.052671	0.790403
Skewness	-0.087023	-0.561700	-0.826492	-0.495304	-0.097431
Kurtosis	4.755148	3.119817	3.953882	3.503981	3.492638
Jarque-Bera	25.01630	10.26425	29.28977	9.933863	2.257000
Probability	0.000004	0.005904	0.000000	0.006964	0.323518
Observations	193	193	193	193	193

Source: Outputs of data processing using EViews 10.

Table 3. Correlation coefficients between research variables

	SMR	CCC	CCD	NCC	NCD
SMR	1.00000				
CCC	-0.08375	1.00000			
NCC	-0.13325	0.90213	1.00000		
NCD	-0.05397	0.93389	0.79454	1.00000	
NCD	-0.14266	0.65501	0.66503	0.62168	1.00000

Source: Outputs of data processing using EViews 10.

Regarding normality, Jarque-Bera values indicate that all variables are normally distributed at p-value of 0.01 for most of the research variables. Regarding multicollinearity, the correlation coefficients among independent variables range from 0.62168 to 0.93389, which indicates that multicollinearity problem does exist and this is why we will use these variables separately.

5. Testing Hypotheses

The first hypothesis is about investigating the significance of differences between average changes in sector indices of stock markets, according to month of analysis. The null hypothesis H_0 could be shown as:

$$\mu_{SMR\text{-}JAN} = \mu_{SMR\text{-}FEB} = \mu_{SMR\text{-}MAR} = \mu_{SMR\text{-}APR} = \mu_{SMR\text{-}MAY} \quad (10)$$

The alternative hypothesis H_a states that:

$$\mu_{SMR\text{-}JAN} \neq \mu_{SMR\text{-}FEB} \neq \mu_{SMR\text{-}MAR} \neq \mu_{SMR\text{-}APR} \neq \mu_{SMR\text{-}MAY} \quad (11)$$

Wilcoxon Signed Rank test has been conducted to investigate the significance of differences among stock market indicators during March, April and May 2020 compared with the January and February 2020. Table (4) indicates the monthly returns of GCC stock markets, as follows:

Table 4. Monthly returns of GCC stock markets

Index	Jan. 2020	Fab. 2020	Mar. 2020	Apr. 2020	May 2020
SASEIDX	- 0.01791	- 0.07497	- 0.14721	0.09339	0.01408
DFMGI	0.00770	- 0.07182	- 0.31610	0.14413	- 0.04022
ADSMI	0.01096	- 0.04941	- 0.23804	0.13272	- 0.02098
KWSEAS	0.00677	- 0.11212	- 0.14123	0.03166	0.00406
MSM30	0.01853	0.01265	- 0.16525	0.02644	0.00145
BHSEASI	0.02827	0.00172	- 0.18661	- 0.02953	- 0.03136
DSM	- 0.00663	- 0.09116	- 0.13518	0.06784	0.00921
Mean	0.00681	-0.05502	-0.18995	0.06666	-0.00911
Std. Deviation	0.01532	0.04668	0.06589	0.06215	0.02146
Minimum	-0.01791	-0.11212	-0.31610	-0.02953	-0.04022
Maximum	0.02827	0.01265	-0.13518	0.14413	0.01408

When conducting *Wilcoxon Signed Rank* test, comparing the monthly return, results support the significance of difference between Feb., 2020 compared with Mar., 2020, with Z of -2.366 and sig. of 0.018, which means that the drop of monthly return from -5.502% to -18.995% is significant. So, for the first hypothesis, we can assume that there's a significant differences between monthly returns of GCC stock markets during Coronavirus spread compared with the earlier month.

The second hypothesis is about investigating the effect of each of "Coronavirus Cumulative Cases" (CCC), "New Coronavirus Cases" (NCC), "Cumulative Coronavirus Deaths" (CCD) and "New Coronavirus Deaths" (NCD) on "Stock Market Return" (SMR). Model (1) attempts to assess the effects of CCC model (2) concerns with investigating the effects of NCC. Besides, Model (3) investigates the effect of CCD and Model (4) is for NCD.

Table 5. Effects of Coronavirus spread on stock market return using GMM technique

Variable	Model (1)	Model (2)	Model (3)	Model (4)
Panel 5.1: For all period (March to May 2020)				
C	-0. 012041	0.002411	-0.0008973	-0.000910
Coronavirus Cumulative Cases	0.001919			
Cumulative Coronavirus Deaths		-0.00666		
New Coronavirus Cases			0.002704	
New Coronavirus Deaths				**-0.003371**
R^2	0.033091	0.002629	0.044752	0.020707
Durbin-Watson stat	1.825751	1.931512	1.544919	1.519632
Obs.	424	308	391	187
Panel 5.2: For the first period (March 2020)				
C	-0.014484	-0.005730	-0.012036	-0.017307
Coronavirus Cumulative Cases	0.002180			
Cumulative Coronavirus Deaths		-0.006077		
New Coronavirus Cases			0.006379	
New Coronavirus Deaths				**-0.010053**
R^2	0.011495	0.051739	0.062865	**0.307393**
Durbin-Watson stat	1.896340	2.363424	1.720890	2.501683
Obs.	145	32	113	113
Panel 5.3: For the second period (April 2020)				
C	0.002320	0.003242	0.001606	0.007743
Coronavirus Cumulative Cases	0.000137			
Cumulative Coronavirus Deaths		0.000176		
New Coronavirus Cases			0.000452	
New Coronavirus Deaths				0.001365
R^2	0.000062	0.000081	0.000612	0.001417
Durbin-Watson stat	2.027149	2.038492	2.027071	1.432273
Obs.	147	145	147	81
Panel 5.4: For the third period (May 2020)				
C	-0.014206	0.001549	-0.008577	-0.000375
Coronavirus Cumulative Cases	0.002189			
Cumulative Coronavirus Deaths		-0.000212		
New Coronavirus Cases			0.002493	
New Coronavirus Deaths				-0.002932
R^2	0.037021	0.000269	0.034225	0.012999
Durbin-Watson stat	1.761048	2.083964	1.533637	1.579637
Obs.	321	240	294	139

Source: outputs of data processing using EViews 10.

For the whole period, results support the significance of New Coronavirus Deaths (NCD) effect on Stock Market Return (SMR) with explanation power of 2.1%. Findings do NOT provide any significance of each of Coronavirus Cumulative Cases (CCC), New Coronavirus Cases (NCC) or Cumulative Coronavirus Deaths (CCD) effects on Stock Market Return (SMR). Regarding the problem of autocorrelation, Durbin-Watson test has been conducted and indicates that autocorrelation problem does not exist, as DW stat value is between 1 and 3.

When splitting the whole research period into 3 sub-periods, results support the effect of New Coronavirus Deaths (NCD) effect on Stock Market Return (SMR) with explanation power of 30.7% in March. R^2 has been increased from 2.1% to 30.7% and this may be due to the homogeneity of the research period. Figure (3) shows that the decline of market indices has been continued till the end of March 2020, while curves seem to be more flattened in April and May. Stock markets of GCC countries seem to be different than those of China, France, Germany, and Spain, where stock market return seems to be sensitive to cumulative cases, not to new deaths.

So, for the first hypothesis, the null hypothesis is rejected and the alternative one could be accepted. However, for the second hypothesis, the null hypothesis could be accepted for CCC, NCC and CCD, while it's rejected for NCD. Figure (1) shows that the curves tend to be flattened starting from April 2020.

Results indicates that Stock Market Return (SMR) is sensitive only to New Coronavirus Deaths (NCD) in March. This may shed a light on the behavior of stock market in response to informational content regarding Coronavirus spread, where Coronavirus Cumulative Cases (CCC), New Coronavirus Cases (NCC) and Cumulative Coronavirus Deaths (CCD) haven't been considered as bad news. Besides, the effect of New Coronavirus Deaths (NCD) remains only during March.

6. Robustness Checks

A Robustness check has been conducted to investigate the country effect, where we consider the alternative hypothesis Ha: $\beta \neq 0$ versus null hypothesis Hb: $\beta = 0$, where β is the regression coefficient of the following functions:

$$\mathbf{SMR = \alpha + \beta_1 CCC + \beta_2 KSA + \beta_3 UAE + \beta_4 KUW + \beta_5 OMA + \beta_6 BAH + \beta_7 QAT} \quad \mathbf{(12)}$$

$$\mathbf{SMR = \alpha + \beta_1 NCC + \beta_2 KSA + \beta_3 UAE + \beta_4 KUW + \beta_5 OMA + \beta_6 BAH + \beta_7 QAT} \quad \mathbf{(13)}$$

$$\mathbf{SMR = \alpha + \beta_1 CCD + \beta_2 KSA + \beta_3 UAE + \beta_4 KUW + \beta_5 OMA + \beta_6 BAH + \beta_7 QAT} \quad \mathbf{(14)}$$

$$\mathbf{SMR = \alpha + \beta_1 NCD + \beta_2 KSA + \beta_3 UAE + \beta_4 KUW + \beta_5 OMA + \beta_6 BAH + \beta_7 QAT} \quad \mathbf{(15)}$$

Country effect has been considered, where KSA, UAE, KUW, OMA, BAH and QAT denote dummies of Saudi Arabia, United Arab Emirates, Kuwait, Oman, Bahrain and Qatar respectively. Results don't support any evidence about country effect of any of the above-shown dummies.

Another Robustness check has been conducted by reprocessing data after excluding only one stock market and provides the following results:

Table 6. Robustness check by excluding one stock market during March 2020 using GMM technique

Variable	Excluding KSA	Excluding Abu Dhabi	Excluding Dubai	Excluding Kuwait	Excluding Oman	Excluding Bahrain	Excluding Qatar
C	-0.014023 (0.008997)	-0.014023 (0.008997)	-0.014728 (0.01122)	-0.017307 (0.010602)	-0.017307 (0.010602)	-0.042595 (0.02310)	-0.017307 (0.01060)
New Coronavirus Deaths	**-0.008869 (0.00397)***	**-0.008798 (0.00385)***	**-0.009479 (0.00495)***	**-0.01005 (0.0048)***	**-0.01005 (0.0047)***	**-0.018816 (0.00857)***	**-0.010056 (0.0046)***
R^2	0.384484	0.367514	0.31444	0.307393	0.317544	0.445413	0.327393
Durbin-Watson stat	2.524390	2.677797	2.855646	2.701683	2.693549	2.094206	2.687036
Obs.	10	10	10	12	12	8	12

Source: outputs of data processing using EViews 10.

Results provide that stock markets of the GCC countries seem to be sensitive to Coronavirus spread measured by New Coronavirus Deaths (NCD). These effects haven't been confirmed supporting the rejecting of the null hypothesis of the second hypothesis, providing higher explanation powers; where R^2 is 38.45% when excluding KSA, is 36.75% for ABD, is 31.44% for DUB, is 30.74% for KUW, is 31.75% for OMA, is 44.5% for BAH and is 10.48% for QAT.

7. Summary and Concluded Remarks

This paper attempts to investigate the effects of 2020 Covid-19 world-wide spread on stock markets of GCC countries on daily basis over the period from March 1, 2020 till May 31, 2020. Coronavirus spread has been measured by cumulative cases, new cases, cumulative deaths and new deaths. Coronavirus spread has been measured by numbers per million of population, while stock market return is measured by Δ in stock market index.

Papers conducted in this topic tend to analyze Coronavirus spread in the highly infected countries and focus on the developed stock markets. Countries with low level of infection that have emerging financial markets seem to be less attractive to scholars concerning with Coronavirus spread on stock markets. This is why we try to investigate the GCC stock markets reaction to Covid-19 spread .

Findings show that there are significant differences among stock market indices during the research period. Besides, stock market returns seem to be sensitive to Coronavirus new deaths. Moreover, this has been confirmed for March with R^2 of 30.7%, without any evidence about these effects during April and May.

Results indicates that Stock Market Return (SMR) is sensitive only to New Coronavirus Deaths (NCD) in March. This may shed a light on the behavior of stock market in response to informational content regarding Coronavirus spread, where Coronavirus Cumulative Cases (CCC), New Coronavirus Cases (NCC) and Cumulative Coronavirus Deaths (CCD) haven't been considered as bad news. Besides, the effect of New Coronavirus Deaths (NCD) remains only during March.

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Trends and Policy Implications of Data Envelopment Analysis Method in the Process of Environment Sustainable Development

Xiao Liu[1], Jun Miao[1], Houxue Xia[2], Anqi Qiu[1], Jin Chen[1,3]

[1] College of Economics and Management, Huaiyin Normal University, 71 Jiaotong Avenue, Huaian 223001, China

[2] Business School, National University of Singapore, 15Kent Ridge Drive，119245, Singapore

[3] College of Management, China University of Mining and Technology,1 Daxue Avenue, Xuzhou 221116, China

Correspondence: Xiao Liu, College of Economics and Management, Huaiyin Normal University, 71 Jiaotong Avenue, Huaian 223001, China.

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Abstract

Effective performance evaluation for sustainable development is significantly important for determining the dynamic harmony and balance of environment, economy and society. Data envelopment analysis (DEA) has been widely applied in the field of sustainability evaluation modeling in recent years. In this study, the application of DEA in sustainable development field research is systematically reviewed. The entire framework of DEA in sustainable development research is constructed, and the characteristics of the research works are summarized. The principal characters used in previous studies are identified and compared, and then the methodological framework for deriving sustainable development indicators is introduced. Finally, from the two aspects of method and experience, this study summarizes some beneficial points of model selection. Based on this, the expectation of DEA method in the process of sustainable development is further discussed.

Keywords: Data envelopment analysis (DEA), sustainable development, efficiency, environmental performance

1. Introduction

Since the World War II, emissions generated by human activities have already altered climate change. Biologists find that, over the past fifty years, the increasingly heavy loss of biodiversity has led to the earth's a quarter of largest incidents of life destruction. In 1992, on the United Nations Earth Summit held in Rio de Janeiro, sustainable development (SD) was formally proposed as one of the most urgent subjects for international policy.

SD is a widely used concept and it has become increasingly popular since the famous *Brundtland Report*, in which SD was defined as "development that meets current needs without prejudicing the ability of progeniture succeeding era to meet their own needs" (Becker & Mlligan, 1997). This definition took a comprehensive consideration from three aspects simultaneously: natural resources are recognized as the limited availability; intergenerational equity need is accepted; several social and spatial issues are summarized as intergenerational equity (Dong et al., 2016). As such, SD integrates understanding and acting on the complex interrelationships that exist among the environment, the economy, and society. This is not a balancing act or playing one issue against the other, but an acknowledgement of the correlation dependence character of these three pillars. Despite of the impressive amount of related scientific literature, when it comes to empirical research, SD remains a vague and elusive terminology.

Among the extensive SD modeling techniques, many studies reported that data envelopment analysis (DEA), a non-parametric efficiency evaluation method, is an excellent approach to examining the sustainability performance of decision-making units (DMUs). Specifically, Callens and Tyteca (1999) briefly phrased why DEA can be used to assess sustainability, and pointed out that one of the necessary and inadequate steps to achieve sustainability was the efficiency of economic, social and environmental resources. Zhou et al. (2008) pointed that DEA is a special multi-criteria decision analysis (MCDA) method, which aims at evaluating the relative efficiency of all DMUs, rather than choosing specific action paths as traditional decision analysis does. However, with the increasing application of DEA in SD research, it is timely and meaningful to review and summarize the findings in this field. The main objective of this study is to fill this gap.

2. Basic DEA Model

DEA model was firstly proposed by Charnes et al. (1978) to measure the efficiency and productivity of a group of peer DMUs. DEA efficiency is the ratio of the weighted sums of the outputs and the inputs, under the premise that efficiency unable to exceed the value of 1. As such, the DEA efficiency of a certain DMU will reduce when outputs decrease and/or inputs increase, and vice versa. Under the basic DEA framework, given a set of *K* units (DMU_1, DMU_2,…, DMU_K), each producing *M* outputs from a set of *N* inputs. A certain unit DMU_k consumes $x_{nk} \geq 0$ of input *n* to produce $y_{mk} \geq 0$ of output *m*. This problem can be further transformed into the famous CCR model as follows:

$$\begin{aligned} \max\ & \sum_{m=1}^{M} u_m y_{m0} \\ s.t.\ & \sum_{m=1}^{M} u_m y_{mk} - \sum_{n=1}^{N} v_n x_{nk} \leq 0, \quad k = 1,2,\ldots,K, \\ & \sum_{n=1}^{N} v_n x_{n0} = 1, \\ & u_m,\ v_n \geq 0,\ m = 1,2,\ldots,M; \\ & n = 1,2,\ldots,N \end{aligned} \tag{1}$$

Where u_m and v_n are two vectors of weight that DMU_0 uses to measure the relative importance of the consumed and the produced factors. Despite its liner form, studies usually use CCR in envelopment form to calculate the efficiency score (Zhu, 1996). In fact, the envelopment form is the dual model of (1), as follows:

$$\begin{aligned} \min\ & \theta \\ s.t.\ & \sum_{m=1}^{M} y_{mk} \lambda_k \geq y_{m0}, \quad \mathrm{m} = 1,2,\ldots,\mathrm{M}, \\ & \sum_{n=1}^{N} x_{nk} \lambda_k \leq \theta x_{n0},\ n = 1,2,\ldots,N, \\ & \lambda_k \geq 0,\ \mathrm{k}=1,2,\ldots,\mathrm{K}. \end{aligned} \tag{2}$$

Further considering the constraint set in the model (2):

$$\begin{aligned} T = \Big\{ (x,y) : & \sum_{k=1}^{K} x_{nk} z_k \leq x_n, \quad n = 1,2,\ldots,N, \\ & \sum_{k=1}^{K} y_{mk} z_k \geq y_m, \quad m = 1,2,\ldots,M, \\ & z_k \geq 0,\ k = 1,2,\ldots,K \Big\}, \end{aligned} \tag{3}$$

Where $x = (x_1, x_2, \ldots, x_n)$ is the input vector, $y = (y_1, y_2, \ldots, y_m)$ is the output vector, z_k is a set of intensity variables representing the weighting of each observed DMU_k in the composition of the efficient frontier, and *T* is defined as the reference technology.

As was described by Sarkis and Talluri (2011), DEA has been used widely in various fields in the past decade and there are a large number of extensions. The representative studies listed in Table 1 have been collected. In the following sections, we mainly describe the characteristics of previous studies from the aspects of research type, method and application fields.

Table 1. Representative studies of DEA method in sustainable development field

Publication	*Type of study*	*Methodological aspect*						*Application scheme*
		Production possibility set			*Efficiency measure*	*Model extension*	*Joint with others*	
		Input	*Output*	*RTS*				
Abay et al. (2004)	A	S	W	C	R	MPI	EM	Assessment of sustainability at farm level
Aldeseit (2013)	A	S	S	C+V	R	-	-	Farms sustainability assessment
Andréet al. (2010)	T+A	S	S	C	R	-	MCDM	Agricultural economics and sustainability
Arabi et al. (2014)	T+A	S	W	C	SB	ML	-	Eco-efficiency measurement
Gutierrez et al. (2009)	T+A	S	S	V	SB	-	LCA	Eco-efficiency of electric and electronic appliances
Battese & Coelli (1995)	T	S	S	C	R	-	SFA	Agricultural sustainability measurement
Donghyun & Almas (2010)	T+A	S	W	C	DDF	ML	-	Environmentally sensitive productivity growth assessment
Dong et al. (2016)	T+A	S	S	C	R	-	LCA	Assessing sustainability in agricultural sectors
Egilmez & Park (2014)	T+A	S	S	V	R	SA	LCA	Sustainability measurement of manufacturing sector
Egilmez et al. (2014)	A	S	W	C	R	-	LCA	Sustainability assessment of supply chain
Ewert et al. (2005)	A	S	W	V	R	ML, SA	-	Measurement of economic, environmental and social sustainability in agricultural
Gerdessen & Pascucci (2013)	A	S	S	C+V	R	-	-	Assessment of sustainability at farm level
Gomes et al. (2009)	T	CCR extensions with undesirable outputs considered			NR	-	-	Assessment of sustainability at farm level
Gutierrez & Lozano (2009)	T+A	S	S	C+V	R	-	-	Sustainability measurement of manufacturing sector
Hoang & Alauddun (2012)	T+A	S	S	C+V	R	-	-	Agricultural sustainability
Houshyar et al. (2012)	T+A	S	S,W	C	SB	MPI	Multi fuzzy modeling	Sustainable and efficient energy consumption of corn production
Iribarren & Rowe (2013)	T+A	S	W	C	SB	-	LCA	Sustainability of product systems assessment
Juo et al. (2015)	T+A	S	W	V	NR	ML	-	Productivity estimation with pollutions considered
Khodakarami et al. (2015)	T+A	S	W	V	NR, SB	MPI	-	Assessment of sustainability supply chain
Korhonen & Luptacik (2004)	T+A	CCR extensions with undesirable outputs considered			DDF	-	-	Eco-efficiency measurement
Li (2010)	T+A	S	W	C	DDF	PDA	-	CO2 emission performance assessment
Louhichi et al. (2010)	T+A	S	W	C+V	R, SB	-	AHP, MCDM	Measurement of economic, environmental and social sustainability in agricultural
Mahdiloo et al. (2015)	T+A	S	W	C	R	MPI	MOLP	Assessment of sustainability supply chain
Senante et al. (2014)	A	S	S	V	R	MPI	AHP	Sustainable performance of wastewater treatment plants
Senante et al. (2016)	T+A	S	W	V	DDF, NR	-	-	Eco-efficiency assessment of wastewater treatment plants
Munksgaard et al. (2008)	T+A	S	S	C	R	-	LCA	Sustainable consumption
Reig-Martinez	A	S	W	C	R	-	MCDM	Assessment of

et al. (2011)								sustainability at farm level
Reinharda et al. (2000)	T+A	S	W	V	NR	SA	SFA	Estimation of comprehensive environmental efficiency
Sueyoshi & Wang (2014)	T+A	S	W	V	R, NR	-	-	Assessment of sustainability supply chain
Sueyoshi & Yuan (2015)	T+A	S	W	C+V	SB	-	-	Regional sustainability and diversity
Sueyoshi & Goto (2015)	T+A	S	W	C	R	MPI	-	Environmental assessment in time horizon
Sueyoshi & Yuan (2016)	T+A	S	W	V	SB	-	-	Assessment of transformation marginal rate among production factors
Sueyoshi et al. (2018)	T+A	S	W	C	R, NR	-	MCDM	Sector sustainability on fossil fuel power plants
Tatari & Kucukvar (2012)	T+A	S	S	C	R	-	LCA	Measurement of sustainability performance
Vandaele et al. (2013)	A	S	S	C+V	R	-	-	Sustainable R&D portfolio assessment
Zanella et al. (2015)	A	S	W	V	DDF	ML	-	Cities' livability
Zhou et al. (2007)	T+A	S	W	C	NR	MPI	-	Environmental sustainability measurement
Zhu et al., (2014)	A	S	W	C	R	-	-	Assessment of the products eco-efficiency

Note: T: theory; A: application; S: strong-disposable; W: weak-disposable; C: constant returns to scale; V: variant returns to scale; R: radial; NR: non-radial; SB: Slacks-based; DDF: directional distance function; MPI: Malmquist productivity index; ML: Malmquist-Luenberger productivity index; PDA: production decomposition analysis; SA: sensitive analysis; LCA: life cycle analysis; AHP: analytic hierarchy process; SFA: stochastic frontier analysis; MCDM: multi-criteria decision making.

3. Methodological Development and Issues in SD

The methodological development and issues in SD field can be broken down into three parts: the key elements of DEA model, the extensions of DEA model and the DEA model joint with other methodologies. Furthermore, the methodological development can be characterized by the reference technology, the efficiency measurement, the preference, the super efficiency DEA model and other DEA models. The extensions of DEA model includes Malmquist productivity index (MPI), Malmquist-Luenberger productivity index (ML), production decomposition analysis (PDA) and sensitive analysis (SA). According to the review, we also find that DEA model applied in SD usually combines with other methods such as life cycle analysis (LCA), analytic hierarchy process (AHP), stochastic frontier analysis (SFA) and multi-criteria decision making (MCDM). Fig. 1 generally presents the DEA model framework and the most widely used mode types in SD studies.

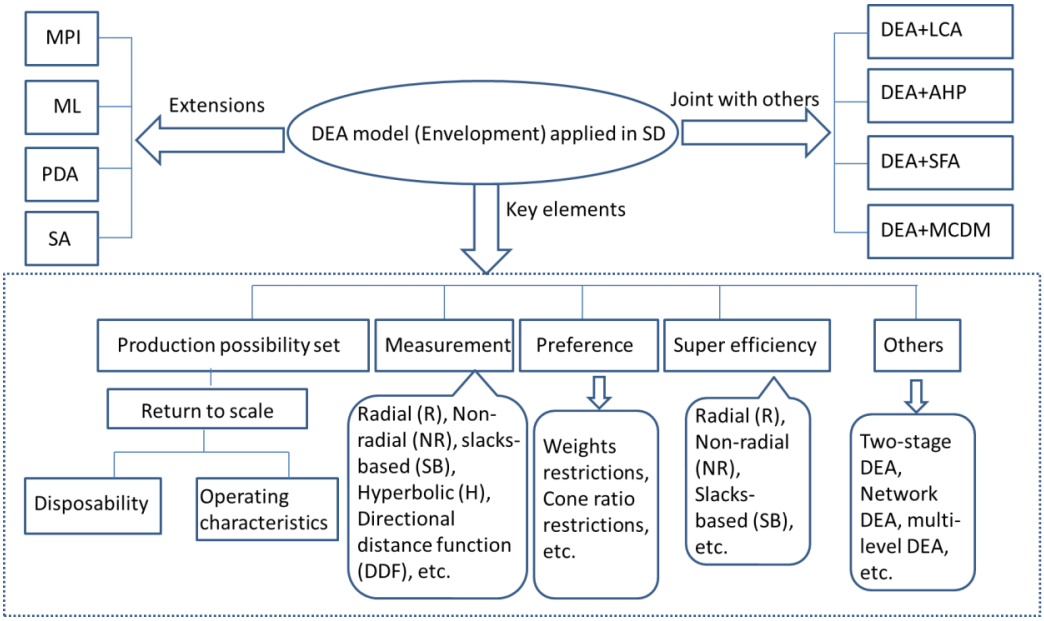

Figure 1. General framework of DEA model and methods in sustainable development studies

3.1 Key Elements

The methodology of DEA includes some key elements, and the specific DEA model form is determined by these key elements. Usually, the key elements applied in SD incorporate the follows: (1) production possibility set; (2) efficiency measurement; (3) preference; (4) super efficiency. The different combinations of these elements can form the various types of DEA models, with which to figure out different issues.

3.1.1 Production Possibility Set

Traditionally, in basic DEA model, the production possibility set satisfies that if $(x, y) \in T$ and $x' \geq x$ (or $y' \leq y$) then $(x', y) \in T$ (or $(x, y') \in T$). Both inputs and outputs are denoted as freely or strongly disposable.

Not surprisingly, as shown in Table 1, most representative studies that evaluate sustainability performance assume all the inputs are freely disposal. However, in the real production process, people can't avoid the undesirable outputs. For example, energy consumption pulls up the economic increasing, meanwhile, the undesirable outputs such as the emission of CO_2 and SO_2 are always accompanied. As such, reducing undesirable outputs would likely to be costly. Therefore, using the freely disposability production possibility set is not appropriate. In order to overcome this issue, many methods are put forward. Of which, undesirable outputs ($u = (u_1, u_2, \ldots, u_j)$) weak disposability technology has been widely used (Zhou et al., 2008). The weak disposability production possibility set can be characterized as follows:

$$\begin{aligned} T_e = \Big\{ (x, y, u) : & \sum_{k=1}^{K} x_{nk} z_k \leq x_n, \quad n = 1, 2, \ldots, N, \\ & \sum_{k=1}^{K} y_{mk} z_k \geq y_m, \quad m = 1, 2, \ldots, M, \\ & \sum_{k=1}^{K} u_{jk} z_k = u_j, \quad j = 1, 2, \ldots, J \\ & z_k \geq 0, \ k = 1, 2, \ldots, K \Big\}, \end{aligned} \tag{4}$$

T_e could be regarded as a more realistic production technology due to the desirable and undesirable outputs are both considered simultaneously. Similarly, the case of inputs can also be generalized (Färe et al., 2001). As such, T_e has been greatly used in the SD field, especially in the situation like sustainability assessment, environmental performance measure, and environmental regulation impacts evaluation with undesirable pollutants consideration. This may explain why the majority of studies listed in Table 1 prefer to use T_e as production possibility set, such as Houshyar et al. (2012), Sueyoshi and Wang (2014), Sueyoshi and Gote (2015), and

Khodakarami et al. (2015). In these studies, the T_e technology is more attractive because of its theoretical property advantages and the better depiction of the real production process. However, there are still some exceptions such as Egilmez et al. (2013), Senante et al. (2014) and Dong et al. (2016) which do not take undesirable outputs into consideration.

Returns to scale (RTS) is another major trait of the production possibility set. Generally, the traditional CCR-DEA model assumes the constant return to scale (CRS), however, if a constraint $\sum_{k=1}^{K}\lambda_k = 1$ is added to T, the model will change to permit dealing with variable scale efficiency (VRS). As such, model (2) will change from CCR to the BCC model. Meanwhile, it is also applicable to get the non-increasing returns to scale (NIRS) reference technology by adding the constant to T (Ramanathan, 2005). In general, previous discussions were mainly based on strong disposable production possibility set, while VRS conditions could be properly combined with weak disposable production possible set as well (Zhou et al., 2007).

From the present literature listed in Table 1, we found that about a half of the studies in SD field assume the production possibility set as CRS, in spite of the VRS assumption might be more consistent with the actual production process (Ramanathan, 2005). The possible reason is that the CCR model has a better property than the BCC model, which is concretely embodied in the characteristic of the input-oriented radial efficiency is exactly the reciprocal of the output-oriented radial efficiency. As a result, under the CRS assumption, there will be no difference between input or output oriented DEA model. Furthermore, among the reviewed literature listed in Table 1, almost 17% of the studies were conducted under both the CRS and the VRS assumption. In this way, the scale efficiency of each DMU can be made further efforts on estimation. This method has been successfully applied by Pacudan and Guzman (2002) and Liu et al., (2017).

3.1.2 Efficiency Measurement

The efficiency of sustainable development measurements mainly includes input oriented, output oriented and undesirable output-oriented methods, and each one has its own advantages. In this study, we only introduce some widely used and representative methods in the study of SD.

Radial efficiency measurement is the most widely used method in the DEA model, which can adjust the input (output) in a certain proportion (Andersen & Petersen, 1993). By combining radial efficiency measurement with different reference techniques, various DEA models can be obtained including BCC and CCR. If using T_e and undesirable outputs efficiency to adjust the radial efficiency measurement, we will get a model as $\min\{\theta:(x_0, y_0, \theta u_0)\in T_e\}$, which can be used to measure the sustainability of a certain DMU_0.

Non-radial efficiency measurement can help to adjust the different input (output) non-proportionally (Chen & Sherman, 2004). A widely used non-radial efficiency measurement is the Russell efficiency ($\min\left\{\frac{1}{N}\sum_{n=1}^{N}\theta_n : (\theta x_0, y_0)\in T\right\}$), where θ is a vector consisting of θ_1 to θ_n (Färe et al., 1994). When giving the weights for θ_n $(n=1,2,\ldots,n)$, the reference structure of each DMU can be obtained simultaneously (Sueyoshi et al., 2017). Because of the high identify ability; researchers are willing to use the non-radial efficiency measurement. Specifically, some studies adopted both radial and non-radial measurements, which tried to avoid the methodological bias in empirical research.

In addition to radial and non-radical efficiency measurements, slacks-based efficiency measurement is another way to measure DMU efficiency. Especially, the efficiency measurement on account of slack provides a more pragmatic index for evaluating environmental performance and has higher capacity of discernment (Hu & Kao, 2007). This method can be directly modeled from the slacks in inputs (outputs), which is particularly useful in SD assessment.

In some studies, from the practical application aspect, directional distance function (DDF) efficiency measurement may be more appropriate. For example, in the process of sustainability assessment, DDF efficiency measurement can provide a more reasonable productivity index when we need to take both ideal and

unsatisfactory outputs into consideration at the same time (Zanella et al., 2015). Additionally, in fact that the traditional radial efficiency method is another form for DDF (constrained by the specific direction); as such DDF is a more general concept.

3.2 DEA Types

3.2.1 Preference

Preference is a kind of binary relations which builds upon the alterative offers, representing the scheme's strengths and weaknesses judged by decision makers. Preference can be divided into rational preference and irrational preference. Pareto preference is a kind of rational preference, which is commonly adopted in DEA models. This part will discuss some other DEA models with rational preference.

The common method to bring in preference is to add appropriate weights restrictions into classical DEA models (CCR / BCC). Generally, weights restrictions are introduced through DEA models in multiplier form. Allen et al. (1997) pointed that weights restrictions can be primarily classified into four categories, as is shown in Table 2: (1) absolute weights restriction; (2) assurance regions of type I; (3) assurance regions of type II; (4) weight restrictions on virtual input and outputs. In addition, studies related to weights restrictions DEA model can be seen in Cook et al., (2005).

Table 2. The classification of weights restrictions

Type	Weight restriction	
	Weight restrictions on inputs	Weight restrictions on outputs
Absolute weights restriction	$\delta_i \le v_i \le \tau_i$	$\rho_r \le \mu_r \le \eta_r$
Assurance regions of type I	$k_i v_i + k_{i+1} v_{i+1} \le v_{i+2}$ $\alpha_i \le v_i / v_{i+1} \le \beta_i$	$w_r \mu_r + w_{r+1} \mu_{r+1} \le \mu_{r+2}$ $\theta_r \le \mu_r / \mu_{r+1} \le \phi_r$
Assurance regions of type II	$\gamma_i v_i \le \mu_r$	
Weight restrictions on virtual input and outputs	$\varphi_i \le v_i x_{ij} \Big/ \sum_{i=1}^{m} v_i x_{ij} \le \vartheta_i$	$\varpi_i \le \mu_r y_{rj} \Big/ \sum_{r=1}^{s} \mu_r y_{rj} \le \sigma_r$

Note: ($\delta_i, \tau_i, \rho_r, \eta_r, k_i, w_r, \alpha_i, \beta_i, \theta_r, \gamma_i, \varphi_i, \vartheta_i, \varpi_r, \sigma_r$) are pre-established constant.

Charnes et al. (1989) proposed the cone ratio restriction DEA model when decision makers' preference structure showed "cone preference". The model can be defined as follows:

$$Max\ \theta = \frac{\mu^T y_0}{v^T x_0},\ s.t.\ v^T X - \mu^T Y \in K;\ v \in V \setminus \{0\}, \mu \in U \setminus \{0\}, \tag{5}$$

Where $X = (x_1, x_2, \ldots x_0, \ldots, x_n)$ is a $m \times n$ matrix, $Y = (y_1, y_2, \ldots y_0, \ldots, y_n)$ is a $s \times n$ matrix, $V \in R_+^m$, $U \in R_+^s$ and $Int\ V \ne \varphi, Int\ U \ne \varphi$.

Subsequently, Charnes et al., (1990) conducted a further research on the optimal solution of cone ratio restriction DEA model. In addition, there are some other DEA models containing rational preference, including average preference DEA, matrix preference DEA and lexicographical order preference DEA.

In some cases, the preferred DEA model may be more suitable for SD practical applications. It is indicated that studies which conduct sustainability assessments tend to use preferred DEA models in Table 1. Examples of such studies include Reig-Martinez et al., (2011) and Khodakarami et al., (2015). The preference DEA model is to judge and weight the scheme's strengths and weaknesses, which is consistent with the purpose of SD analysis.

3.2.2 Super Efficiency

DEA efficient and inefficient DMUs can be distinguished by the efficiency value, but the key problem is that they can't rank the DEA efficient DMUs. During the process of efficiency evaluation, there are generally more than one DMUs on the production frontier simultaneously, these DMUs' efficiency values all equal to unit. In order to compensate for it and evaluate the real DMUs' efficiency, Super-efficient DEA model has been designed. Super efficiency DEA is a kind of comprehensive efficiency measurement, which can go a step further differentiate relative efficiency among DMUs (Chen & Sherman, 2004). It has the resembling functional expression with CCR model and it can be described as following:

$$\begin{aligned} &\min\ \theta \\ &s.t.\ \sum_{\substack{j=1 \\ j\neq k}}^{n} X_j\lambda_j \le \theta X_k \\ &\sum_{\substack{j=1 \\ j\neq k}}^{n} Y_j\lambda_j \ge Y_k \\ &\lambda_j \ge 0,\ j=1,2,\ldots,n \end{aligned} \tag{6}$$

When calculating the relative efficiency of a DMU, the output Y of the DMU and all DMU_j (j=1, 2, ..., k) can be expressed by linear relation，not only the input and output of the k^{th} DMU in the traditional DEA model. In traditional DEA model, DMUs have the same efficiency value regardless of their efficiency level. However, in the super efficiency DEA model, this defect can be compensated by displaying different efficiency values of efficient DMUs. The efficient DMU's inputs can be proportionally increased with constant efficiency value, while the increase of input rate is the super efficiency value in super-efficient DEA model. For example, given the DMU's sustainability efficiency value is 1.1, which means when increase 10% of the DMU's inputs, its sustainability efficiency value is still above one. Super efficiency value represents the maximum range while DMU maintains efficient in the premise.

3.2.3 Network

In the real process of economy activities, DMUs usually can be divided into two stages: the outputs generated in the first stage will become the second stage's inputs. Seiford and Zhu (1998) proposed a well-known two-stage case by using DEA model to measure the efficiency of each stage, without considering the relationship between different stages. In view of this, Kao and Hwang (2008) took the relationship comprehensively into account and constructed the corresponding model. Iribarren et al. (2010) put forward a method to measure integrated efficiency by weighted summation. Wang and Chin (2010) found that the integrated efficiency could also be measured by harmonic mean, and extended Kao and Huang's model to the VRS reference technology.

A drawback exists in the traditional DEA model is that the model can't involve the relationships between different DMUs in the organization. To compensate, Cook et al., (2010) proposed a method of network DEA, which could open the "black box" to evaluate the integrated DMUs' efficiency and the relative efficiency of each part in the organization. Hsieh and Lin (2010) studied the theoretical framework in a further step.

3.3 Extensions

The application of DEA described above is limited to cross-sectional analysis, such as comparing the efficiency of different regions at the same time. However, for SD studies, especially in the environmental performance evaluation field, it is of great significance for the investigating of productivity change in the production process.

Because of the nonparametric and formal time-series characteristics, Malmquist productivity index (MPI) and Luenberger productivity index (LPI) have been widely used for the comparing of different DMU performance over time. Based on the inputs and outputs, assuming that $\theta^t(x_0^t, y_0^t)$ and $\theta^{t+1}(x_0^t, y_0^t)$ are the DMU_0's efficiency values at time period t for two different reference technologies. Specifically, in order to simplify the description, all the efficiency values are calculated based on the input-oriented. According to the study of Färe et al. (1994), MPI_0 can be written as:

$$MPI_0 = \left[\frac{\theta^t(x_0^t, y_0^t)}{\theta^{t+1}(x_0^t, y_0^t)} \frac{\theta^t(x_0^{t+1}, y_0^{t+1})}{\theta^{t+1}(x_0^{t+1}, y_0^{t+1})}\right]^{1/2} \times \frac{\theta^{t+1}(x_0^{t+1}, y_0^{t+1})}{\theta^t(x_0^t, y_0^t)} \tag{7}$$

$MPI_0 > 1$, $MPI_0 = 1$ and $MPI_0 < 1$ respectively indicate that during the period t to t + 1, the DMU_0's productivity has experienced increased, unchanged, and decreased. The optimal frontier change between two periods reflects the change of production technology (the first part of MPI_0 in Eq. (7)), and the change in relative efficiency reflects the efficiency change over time (the second part of MPI_0 in Eq. (7)). Similarly, LPI can also be decomposed into two proportions to represent technology transformation and efficiency change respectively. Balk et al. (2008) discussed the exact relations between LPI and MPI, and they showed how the LPI transformed into the MPI.

In order to correctly measure environmentally sensitive productivity growth, combining the merits of both Malmquist and Luenberger (integrates the concepts of the MPI and a directional distance function), Chung et al. (1997) proposed a Malmquist-Luenberger productivity index (hereafter, ML index). Additionally, from the distribution perspective, the ML index also provides another way to reallocate the weights of both desirable and undesired outputs. This is very useful and applicable in the real production process. As to the application scheme, sustainability assessment studies of productivity analysis usually tend to use ML rather than MPI and LPI indexes, as is exactly shown in Table 1. A representative example of such studies includes Oh (2010) and Juo et al. (2015). According to the above studies, even the ML index cannot directly reflect the welfare changes; it is helpful to provide a picture for the productivity change under the sustainable development regulations which are warmly concerned by the society.

Based on the productivity evaluation, in order to further understand the influence of each dimension in the sustainability assessment, sensitivity analysis is usually conducted. Charnes et al. (1992) firstly introduced sensitivity analysis by using DEA models. They assumed that, for a certain DMU in the certain production process, its inputs and outputs are synchronized in proportion while the other DMUs are unchanged.

Furthermore, Brannlund et al. (1998) pointed out that DEA is also a valid tool for studying the subject of emissions permit allocations in the SD topic. Recently, a decomposition technique has been proposed by using the distance function obtained in MPI estimation, which can be seen in the studies of Zhou and Ang (2008). By combining decomposition analysis with MPI, these studies decomposed assessment into technical efficiency and technical progress efficiency. Zhou and Ang (2008) named this technique the production theoretical decomposition analysis (PDA) As is shown in Table 1, PDA has already been applied in SD studies and it may provide a new direction for future research.

3.3 Joint with Others

In the field of sustainability assessment, literatures are abundant with articles which utilized a joint application of DEA and other methodologies. As showed in Table 1, the four most common methodologies are life cycle analysis (LCA), analytic hierarchy process (AHP), stochastic frontier analysis (SFA) and multi-criteria decision making (MCDM).

The integration of life cycle analysis and data envelopment analysis (LCA + DEA) to analyze the sustainable performance has been widely used. Of the studies listed in Table 1, about a quarter articles adopt this combination. As one of the representative articles, Egilmez et al. (2014) proposed the hierarchical LCA and DEA method to assess the American manufacturing sectors' sustainability performance. Iribarren and Rowe (2013) indicated that the key point to apply LCA and DEA to evaluate sustainable performance is the further explanation for LCA's results in DEA model.

Varieties of indicators in economic, social and environmental aspects usually need to be considered simultaneously in the process of sustainability assessment. The indicators have to be transformed into data in the first step, but the conversion process usually makes mistakes. Due to incorrect conversions, these indicators may lead to errors in the final result. In order to improve the accuracy of data conversion, the analytic hierarchy process and data envelopment analysis (AHP + DEA) is often integrated to analyze the sustainable performance. Take the research of Lee et al. (2010) as an example; they evaluated the sustainability of national hydrogen energy technology by combining fuzzy AHP and DEA. Of which, the fuzzy AHP was effectively applied to obtain accurate input and output data, and then the DEA model was used to evaluate the sustainability performance.

Stochastic frontier analysis (SFA) is an effective parametric mathematical optimization method that was originally proposed to measure a set of peer DMUs' efficiency and productivity. It is important to confirm the specific production function and select the appropriate variables before using SFA method. Stochastic frontier analysis and data envelopment analysis (SFA + DEA) are usually integrated to analyze the sustainable performance，which can be classified into two types generally. One is using SFA and DEA to evaluate the performance of the DMUs respectively, and then comparing the differences between the values of two methods. The other is integrating SFA and DEA into multi-stage model. For example, SFA was used based on the results of DEA (Huang et al., 2020).

In the process of performance evaluation, it is inevitable to choose unrealistic weights when different DMUs are identified. In order to solve this problem, Golany (1988) proposed a new theoretical method which combined DEA and MCDM (MCDM + DEA). And the approach has become much more popular these years. The utilization of MCDM has created a new way to solve the problems of ranking DMUs that exists in the conventional DEA models.

4. Application Scheme

The review found that eco-efficiency performance evaluation accounts for the majority of the reviewed studies, followed by the applications of agriculture and supply chain management sustainability analysis.

Eco-efficiency is addressed by the OECD in 1998, defined as the efficiency of using ecological resources to meet the needs of human beings. There is a hot topic about eco-efficiency measurement in SD studies, because the increasing eco-efficiency value can be seen as an intermediate step towards the sustainability of the production process. Among the reviewed studies listed in Table 1, about a third of the articles dealt in this area. It might be the result of the increasing global attention about the environmentally sustainable development consciousness. Additionally, the outstanding advantage of DEA approach helps to construct a standardized and comprehensive environmental performance index. However, there seems to be an increasing tendency for using DEA in a single entity rather than a macro-level. Particularly, in the field of farm (Jos éet al., 2012), company (Sueyoshi & Wang, 2014), and industry (Egilmez & Park, 2014), DEA approach has been widely applied.

Because of the growing global population, agriculture is needed to provide large quantities of food and fiber. As such, the productive activity of agriculture is a privileged area of sustainability analysis. In Table 1, it is clear that DEA has become an important tool for studying the sustainability of agricultural. Färe et al. (1985) was the first one to apply the DEA concept to investigate agriculture sustainable development. Then, Battese and Ceolli (1995) investigated the frontier function and agricultural economics to present their applications for measurement. Afterwards, Van et al., (2007) applied the DEA to solve the problem of economic, environmental and social sustainable development of agriculture. Table 1 also shows that the assessment of sustainability analysis at farm-level has been growing in much popularity in recent years.

Supply chain management was defined that “all those activities associated with transformation and flow of goods and service from raw material acquisition to end user’s consumption, including their attendant information flows”. Sustainable supply chain management (SSCM) has been widely concerned by scholars and practitioners in the past few years, and has become a method to improve economic, social and environmental performance at the same time. The evaluation of SSCM is a significant important task for any type of organizations. DEA is an appropriate evaluation method. Among the studies listed in Table 1, about a quarter deals with this area, and most of them appeared in the recent 10 years. There are two advantages of applying DEA method into the SSCM system. One is that the multi-input and multi-output complex system based on the DEA method can well describe the characteristics of the dynamic system. The other is that different type of DEA models can be used to evaluate the SSCM in different dimensions. Considering the importance of SCCM and the evaluation ability of DEA method under the combined action of multiple factors, DEA technology will play a more important role in SSCM research in the future.

Except for the previous application areas mentioned above, the DEA method has also been used to investigate the performance and efficiency of certain industrial sectors, for example, oil and coal industrial sector, food industrial sector, processing and manufacturing and motor vehicle industrial sector (Sueyoshi & Goto, 2014). Additionally, exactly as the illustration by Khodakarami et al. (2015), DEA is an effective tool to study the distributive problems in sustainable development too.

5. Guidelines and Outlook

5.1 Guidelines

In the early stages of the SD concept, it has been obvious that variable selection and quantitative indicators played a vital role. However, due to many kinds of indicators, how to choose the appropriate variables among the many indicators for sustainability assessment is a problem. Customarily, possible inputs and outputs list that may be relevant to research should be firstly established. The second step is to further examine these input and output variables by means of preliminary judgment and statistical analysis. Thus, retaining the most appropriate and relevant indicators. Generally, in the empirical applications, the more the number of DMUs the better the evaluation effect will be. However, due to the data collect availability, in the process of variable determination, discrepancies in statistical quality and indicators make it very difficult to search data. According to a widely adopted rule, the number of DMUs should be more than two times the total number of inputs and outputs.

According to the review of the previous studies, many different types of DEA models are suitable for the efficiency evaluation. As a result, when scholars apply DEA method to study SD problems will inevitably encounter how to choose a specific DEA model problem. In a study, Ang (2004) pointed out that the four basic principles of the method selection are the theoretical foundation, adaptability, ease of use, and ease of result interpretation. Taking these into account, it is meaningful to systematically summarize and reconsider these

principles, especially for the using of DEA in sustainable development research. Generally, in the evaluation of sustainable development field, the combination of traditional DEA and directional distance function method is more suitable for evaluating a DMU's production efficiency. Just as the description of Zhou et al. (2006), if a composite eco-efficiency index is expected, due to the better discrimination, the slacks-based efficiency measure should be adopted. Besides, if researchers try to identify the sustainability performance, the non-parametric MPI and LPI indexes based on the CCR model are strongly recommended.

5.2 Outlook

The reason we study the performance of sustainable development is to balance the complex interconnections between the environment, economy, and society. Specifically, for an enterprise, the enterprise has to balance the distribution between production efficiency and environmental efficiency during the production process. As a result, how to formulate a suitable distribution mechanism, stipulate the distribution principles and harmonize the performance and fairness are all required to explore in a further step.

Conventionally, the DEA model applied in sustainable development doesn't consider the inner structure and external relationship of DMUs. Nevertheless, the different DMUs are related to each other in the real production process, which need to analyze the inner "black box" of DMUs. Although some researchers and models have focused on this aspect (as is shown in 3.1.5), the studies and the achievements are still not enough. For the complexity analysis of the SD internal network, it is still necessary to study the inherent structure and characteristics of the SD method.

6. Conclusions

DEA method has been applied to the field of sustainable development by a large number of professionals and has achieved abundant research results, however, there still has no systematic literature review for the future reference. Therefore, this article provides a comprehensive and systematic review of previous research results to fill this gap in SD, which will facilitate future research.

In terms of mathematical methods, we concluded that DEA models with the reference technology of constant return to scale and the radial efficiency measurements are the most widely applied in SD field. Scholars prefer to take desirable outputs and undesirable outputs into account, and tend to use the DDF efficiency of the environment DEA method in the area of sustainable development research. If the performance of the DMUs changes with time, the DEA model usually deals with different variants in conjunction with MPI, ML, and PDA methods. At the same time, we found that scholars are increasingly concerned about the combination of DEA and other methods, such as LCA, SFA, AHP and MCDM. In terms of empirical applications, we found that studies associated with eco-efficiency performance evaluation are shown the most, followed by the applications of agriculture and supply chain management sustainability analysis.

According to the literature review and analysis, we have compiled some guidelines and outlook for the DEA method used in the research of sustainable development. Sustainable development has become a global research hotspot, which involves all aspects of economy, environment and society. In addition, DEA method carries out relative efficiency evaluation according to a number of inputs and outputs. We have reasons to believe that DEA method will play an increasingly important role in the field of sustainable development.

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The Impact of Supervisor Support on Employees' Psychological Wellbeing: A Parallel Mediation Analysis of Work-To-Family Conflict and Job Satisfaction

Erasmus Keli Swanzy[1]

[1] University of Bologna, Italy

Correspondence: Erasmus Keli Swanzy, University of Bologna, Italy.

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Abstract

This study tries to examine the influence of work-to-family conflict and job satisfaction on the relationship between supervisor support and the psychological wellbeing of 290 administrative workers at the University of Cape Coast, Ghana. The results of the parallel mediation analysis showed that supervisor support had a significant positive impact on employees' psychological wellbeing and job satisfaction and also had a significant negative impact on employees' work-to-family conflict. Moreover, the study found a direct positive effect of employees' job satisfaction on their psychological wellbeing but did not find a direct negative effect of employees' work-to-family conflict on their psychological wellbeing. In addition, job satisfaction mediated the association between supervisor support and the psychological wellbeing of employees. The study however found no evidence of the mediating influence of work-to-family conflict on the relationship between supervisor support and employees' psychological wellbeing. Both theoretical and practical implications were further discussed.

Keywords: supervisor support, psychological wellbeing, work-to-family conflict and job satisfaction

1. Introduction

With the dynamics in technological advancement and it impacts on work and workplace, research on supervisor support has increasingly gained attention by researchers and practitioners in the past few decades particularly with regards to employees' wellbeing. Employees' support they received from their supervisors has turned out to have several impacts on workers' burnout, emotional exhaustion, anxiety and depression which may directly or indirectly affect their overall psychological wellbeing (Kawachi & Berkman, 2001, Plaisier et al., 2007, Sinokki et al., 2010).

Hence, it is vital for researchers and practitioners to have a comprehensive knowledge of the mechanisms through with supervisor support could affect employees' psychological wellbeing both directly and indirectly. Notwithstanding the fact that extensive studies have been steered on probing the impact of supervisor support on employees' psychological wellbeing (Beehr, Farmer, Glazer, Gudanowski & Nair, 2003; Gilbreath & Benson, 2004; Gordon, Tang, Day & Adler, 2019; Hämmig, 2017; Kawachi & Berkman, 2001; Plaisier et al., 2007; Rana & Javed, 2019; Sinokki et al., 2010). However, past investigations that explored the significance of supportive supervisor on employees' psychological wellbeing, have not simultaneously examined the mediating roles of work-to-family conflict and job satisfaction on the effect of supervisor support on employees' psychological wellbeing. Hence it remains to be seen whether work-to-family conflict and job satisfaction can serve as a mediating role in the relationship between supervisor support and employees' psychological wellbeing.

Therefore, bearing in mind the gap left by previous studies that explored supervisor support and workers' psychological wellbeing, this current study seeks to investigate the impact of supervisor support on employees' psychological wellbeing via work-to-family conflict or job satisfaction. This is presumably the first study to examine a parallel mediation analysis of this kind on the association between supervisor support and the psychological wellbeing of employees. Conducting a mediation analysis of this kind will additionally elucidate pathways that will aid us to better understand the probable causal effects and interactions among supervisor support and psychological wellbeing, work-to-family conflict and job satisfaction of employees (Shrout & Bolger, 2002).

2. Literature Review and Hypotheses Development

2.1 Supervisor Support

Eisenberger, Stinglhamber, Vandenberghe, Sucharski & Rhoades (2002) explained supervisor support as the level in which subordinates are aware that their supervisors care for and value their welfare and input at work. According to Eisenberger et al. (2002), supportive supervisor provides guidance, assistance and feedback to their employees that are crucial to employees' adaptation in the workplace. With guidance, supervisors provide significant directions to their employees to know their responsibilities and how to carry out these responsibilities. With assistance, supervisors assist in removing any obstacles that may impede their employees in performing their duties accurately. Regarding feedback, supervisors provide valuable information that helps employees to improve upon their performance within the working environment. Guidance, assistance and feedback that employees receive from their supervisors had been known to assist employees to cope with complex situations that occur in the workplace, therefore alleviating occupational stress that may affect employees' psychological wellbeing, work-to-family conflict and job satisfaction.

2.2 The Direct Effect of Supervisor Support on Employees' Psychological Wellbeing

Psychological wellbeing can be explained as the degree to which an individual is effectively functioning or the general effectiveness of a person's psychological functioning (Ryan & Deci, 2001; Sekaran, 1985; Wright & Cropanzano, 2000). Hämmig (2017) suggested the need to consider supervisor support as one of the vital elements in workplace health promotion after conducting a study on 5877 employees and found out that supportive supervisors had a significant influence on their employees' wellbeing. Other studies (Beehr et al., 2003; Gibson, Grey & Hastings, 2009; Gordon et al., 2019; Rana & Javed, 2019; Willemse, de Jonge, Smit, Depla & Pot, 2012) have also found out that supportive supervisors had a significant influence on employees' psychological strain, emotional exhaustion, burnout, anxiety and depressive symptoms which may all contribute to affecting their general psychological wellbeing. In addition, several previous studies (e.g. Gilbreath & Benson, 2004; Kawachi & Berkman, 2001; Plaisier et al., 2007) suggest that social support such as support from supervisors tends to have a positive direct effect on employees' psychological wellbeing. Thus, research findings seem to support the relationship between supportive supervisors and psychological wellbeing leading to the testing of the following hypothesis;

H1: Supervisor support will have a significant positive effect on employees' psychological wellbeing.

2.3 Supportive Supervisors' Impact on Employees' Work-To-Family Conflict

There have been several definitions of Work/family conflict by many researchers, however, Greenhaus and Beutell (1985) explained it as "a form of inter-role conflict in which the role pressures from the work and family domains are mutually incompatible in some respect" (p. 77). Moreover, this conflict has been known to take two different forms known as work-to-family conflict and family-to-work conflict (Frone, 2003; Michel, Kotrba, Mitchelson, Clark & Baltes, 2011). Work-to-family conflict is when the work a person does interfere with his or her family roles while family-to-work conflict is when a person's family roles interfere with his or her work. However, Mesmer-Magnus & Viswesvaran (2005) emphasized that these two forms can be considered separately and be used independently for different studies. Therefore, this current study focuses on employees' work roles interfering with their family roles.

Besides the influence of supervisor support on employees' psychological wellbeing, it has been known that supervisor support can be helpful to employees to cope with their work-to-family conflict (Kossek, Pichler, Bodner & Hammer, 2011; Selvarajan, Cloninger & Singh, 2013; Van Daalen, Willemsen & Sanders, 2006). Ford, Heinen and Langkamer (2007) reported that employees' work-to-family struggles significantly decreases when their supervisors tend to be more supportive of them. This could be attributed to the fact that supportive supervisors are considered as part of social assistance that helps employees in coping with problems related to their work-to-family conflict (Anderson, Coffey & Byerly, 2002; Burke & Greenglass, 1999). In addition, Karatepe and Kilic (2007) explored the work-to-family conflict of 886 staff in Northern Cyprus hotels and found that supportive supervisors had a negative impact on staffs' work-to-family conflict. A more recent study conducted by Talukder (2019) also confirmed that supportive supervisors had a significant negative effect on employees' work-to-family conflict. In light of this reviewed literature, the following hypothesis was tested;

H2: Supervisor support will have a significant negative effect on employees' work-to-family conflict.

2.4 Supportive Supervisors' Impact on Employees' Job Satisfaction

According to Weiss (2002) job satisfaction can be defined as "a positive (or negative) evaluative judgment one makes about one's job or job situation" (p. 175). Anderson et al. (2002) investigated on supportive supervisors

and workers' job satisfaction and found that supportive supervisors played a crucial role in determining the degree of job satisfaction of employees. In addition, several studies that have explored on supervisor support and employees' job satisfaction revealed that the support employees received from their supervisor played a crucial role in influencing their job satisfaction (Alegre, Mas-Machuca & Berbegal-Mirabent, 2016; Gok, Karatuna, & Karaca, 2015; Karatepe & Kilic, 2007; Kula & Guler, 2014; Quresshi & Hamid, 2017; Sergeant & Frenkel, 2000). This may be so because workers feel appreciated, respected and supported when their supervisors tend to be more supportive of them. A study done by Quresshi et al. (2018) on the influence of supportive supervisors on job satisfaction of nurses revealed that nurses' degree of job satisfaction was positively influenced by their supervisors' support. In addition, a recent study conducted by Ahmad et al. (2019) also reported that supervisor support had a significant positive influence on employees' job satisfaction, hence leading to the testing of the following hypothesis;

H3: Supervisor support will have a significant positive effect on employees' job satisfaction.

2.5 Work-family Conflict as a Direct Antecedent of Psychological Wellbeing

Past studies that have explored on employees' work-family conflict have shown that employees' struggles with their work and family roles have a significant effect on several employees' outcomes including psychological wellbeing (Allen, Herst, Bruck & Sutton, 2000; Frone, 2003; Hill, 2005; Kalliath, Kalliath & Chan, 2017; Obrenovic, Du Jianguo & Khan, 2020; Winefield, Boyd & Winefield, 2014). This may be because work-to-family conflict is considered a stressor that affects employees' psychological wellbeing. Accordingly, Lu, Gilmour, Kao and Huang (2006) provided further insights on the influence of work-to-family conflict on employees' psychological wellbeing after conducting a cross-cultural study using British and Taiwanese employees. The study findings showed that employees' struggles with their work and family roles had undesirable effects on employees' psychological wellbeing hence leading to the testing of the following hypothesis;

H4: Employees' work-to-family conflict will have a significant negative effect on their psychological wellbeing.

2.6 Job Satisfaction as a Direct Antecedent of Psychological Wellbeing

Much the same as work-to-family conflict, past studies have also reported the significant effect of job satisfaction on employees' overall health (Dirlam & Zheng, 2017). This is due to the fact that employees who are not satisfied with their work may report higher levels of stress which may affect their overall health. Employees' satisfaction with their jobs is very crucial not only because of the saying that "a satisfied worker is a productive worker" but also because satisfied workers have been known to be healthier than unsatisfied workers. A meta-analysis done by Cass, Siu, Faragher & Cooper (2005) on employees' job satisfaction and their wellbeing revealed that employees' degree of job satisfaction was positively related to their overall wellbeing. A recent study conducted by Karabati, Ensari and Fiorentino (2019) on employees' job satisfaction and wellbeing confirmed that job satisfaction had a profound impact on employees' wellbeing. Another meta-analysis of 485 studies done by Faragher, Cass & Cooper (2005) revealed that job satisfaction was significantly related to employees' general health. Specifically, Faragher and his colleagues (2005) further revealed that job satisfaction was more related to employees' psychological problems than their physical health. Further studies (e.g. Bowling, Eschleman & Wang, 2010; Dirlam & Zheng, 2017; Fischer & Sousa-Poza, 2007) conducted on the impact of job satisfaction on employees' psychological wellbeing have all indicated that higher job satisfaction was associated with improving employees' psychological wellbeing. Based on these findings, the following hypothesis was tested;

H5: Employees' job satisfaction will have a significant positive effect on their psychological wellbeing.

2.7 The Indirect Effect of Supervisor Support on Employees' Psychological Wellbeing via Work-Family Conflict or Job Satisfaction

Previous studies had reportedly found on one side that supportive supervisors tend to help employees' deal with their work-to-family conflict (Ford et al., 2007; Kossek et al., 2011; Selvarajan et al., 2013; Van Daalen et al., 2006). On the other side, other studies have also reported that employees' conflict with their work roles interfering with their family roles, negatively affect their psychological wellbeing because this type of work/family conflict has been known to cause higher stress to employees (Allen et al., 2000; Frone, 2003; Hill, 2005; Kalliath et al., 2017; Winefield et al., 2014). Based on these findings, one could argue that the degree of support employees received from their supervisor could significantly affect their work-to-family conflict which in turn could affect employees' psychological wellbeing, therefore the following hypothesis was tested;

H6: There will be an indirect effect of supervisor support on employees' psychological wellbeing via

work-to-family conflict.

Similarly, past studies that explored on supervisor support and employees' job satisfaction have revealed that supportive supervisors significantly and positively influenced employees' job satisfaction because it helps employees to alleviate the stress that might negatively affect their job satisfaction (Alegre et al.,2016; Galletta, Portoghese, Penna, Battistelli, & Saiani, 2011; Kula & Guler, 2014; Willemse et al., 2012). On the other hand, some past studies that explored on employees' job satisfaction and their psychological wellbeing have shown that employees' degree of job satisfaction significantly affected their psychological wellbeing due to its effect on employees' stress levels (Bowling et al., 2010; Dirlam & Zheng, 2017; Faragher et al., 2005; Fischer & Sousa-Poza, 2007). Therefore, building on these findings, one could argue that the degree of support employees received from their supervisor could result in the level of job satisfaction experienced by employees which in turn could affect employees' psychological wellbeing, hence the following hypothesis was tested;

H7: There will be an indirect effect of supervisor support on employees' psychological wellbeing via job satisfaction.

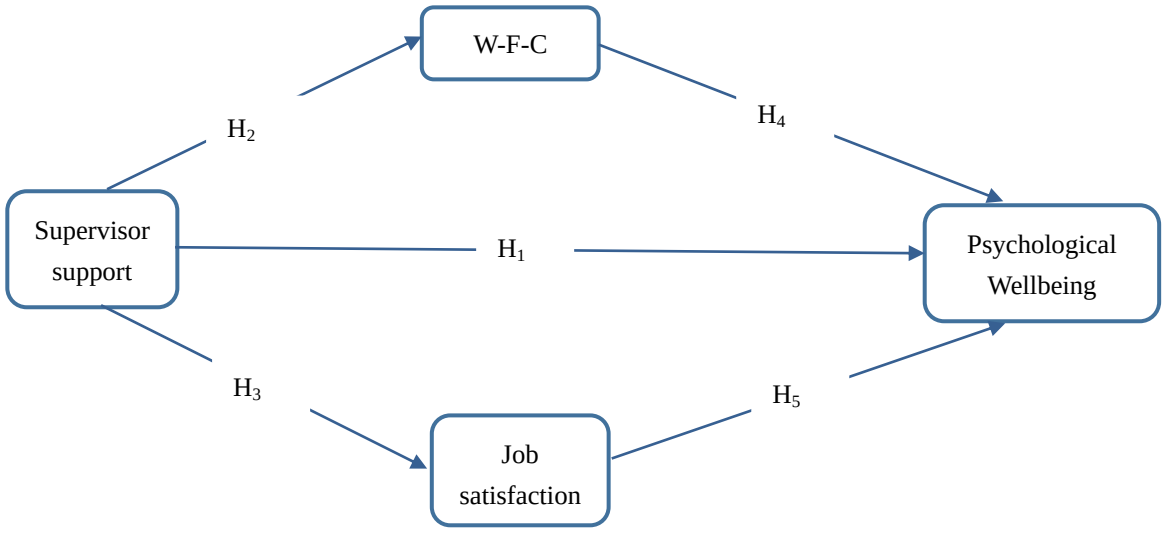

Figure 1. Research model for the study

3. Research Methodology

3.1 Research Design

The current study utilized a cross-sectional study based on primary data as its research design with a quantitative method of collection of data. Self-administered questionnaires were the type of data collection instrument that was used to measure the constructs of the study and to elicit participant responses.

3.2 Sample and Sampling Procedure

The sample of this current study consisted of administrative workers at the University of Cape Coast, Ghana. Simple random sampling was used to gather data on 290 administrative workers. The self-administered questionnaires were administered to participants through online surveys and the drop and collect method. The online survey was developed using Qualtrics and the link was sent to workers through their mails and WhatsApp. Workers who were available in their respective offices were given the questionnaires to fill in person. Out of the 290 administrative workers that responded to the questionnaires, 170 of them were males whiles the remaining 120 were females representing 58.6% and 41.4% respectively. The age of participants ranges from 19 to 60 years with a mean age of 28.40 years (SD = 6.20). In relation to marital status, 168 participants (57.9%) reported not married while the remaining 122 participants (42.1%) reported married.

3.3 Measures

Supervisor Support: Perceived Supervisor Support Scale developed by Eisenberger, Huntington, Hutchinson and Sowa in 1986 was utilized to measure employees' supervisor support. The scale consisted of 4 items on a Likert scale of 5 points which ranges from one which is strongly disagree to five which is strongly agree. Higher scores

denoted higher support received from their supervisors. Samples of the items include: "My work supervisor really cares about my well-being", "My supervisor strongly considers my goals and values", "My supervisor cares about my opinions". The reliability coefficient using Cronbach's alpha for this scale was 0.68.

Work-To-Family Conflict: Work-Family Conflict Scale by Carlson, Kacmar and Williams (2000) was adopted to measure employees' work-to-family conflict. The scale consisted of 18 items on a Likert scale of 5 points- strongly disagree, tend to disagree, neither agree nor disagree, tend to agree and strongly agree– that was scored from one to five. For the present study, 9 items measuring work-to-family conflict were selected. Higher scores specified higher work-to-family conflict. Samples of items are: "My work keeps me from my family activities more than I would like", "I am often so emotionally drained when I get home from work that it prevents me from contributing to my family", "The problem-solving behaviors I use in my job are not effective in resolving problems at home". The reliability coefficient using Cronbach's alpha for this scale was 0.87.

Job Satisfaction: Job Satisfaction Scale developed by Dubinsky and Hartley in 1986 was adopted to measure employees' satisfaction with their jobs. It consisted of 5 items on a Likert scale of 5 points- strongly disagree, tend to disagree, neither agree nor disagree, tend to agree and strongly agree– that was scored from one to five. Higher scores indicated higher job satisfaction. Examples of items under this scale include: "Generally speaking, I am very satisfied with this job", "I frequently think of quitting this job", "I am generally satisfied with the kind of work I do in this job". The reliability coefficient using Cronbach's alpha for this scale was 0.67.

Psychological Wellbeing: Wellbeing index developed by the World Health Organization in 1998 was adopted to measure employees' psychological wellbeing. The scale is popularly known as the WHO (5) wellbeing index. The scale consisted of 5 items on a Likert scale of 5 points- strongly disagree, tend to disagree, neither agree nor disagree, tend to agree and strongly agree– that was scored from one to five. Higher scores indicated higher quality of life. Samples of items are: "I have felt cheerful and in good spirits", "I have felt calm and relaxed", "I woke up feeling fresh and rested". The reliability coefficient using Cronbach's alpha for this scale was 0.81.

4. Results

4.1 Validity and Reliability of Measures

To examine the validity of each of the constructs, a Confirmatory Factor Analysis was used to examine whether all the observed variables that loaded on their latent variables were acceptable to include in the data analysis. Items with a significant factor loading above 0.40 were considered to be good and items below 0.40 were considered unacceptable (Hair, Black, Babin, Anderson & Tatham, 2006). One item (item 5 of job satisfaction) was deleted due to low standardized factor loading below 0.40. The reliability of the instruments was assessed using Cronbach's alpha coefficients. The reliability scores range from 0.67 to 0.87. According to Hair et al. (2006), a reliability score of 0.60 is a threshold that is acceptable.

4.2 Mean, Standard Deviations and Pearson Correlation

Means, standard deviations and Pearson correlation were computed to probe the associations among the variables of this current study. Table 2 revealed that there were significant correlations in direction to the research model for this study. Values displayed in Table 1 indicate that positive significant associations were found among supervisor support, job satisfaction and psychological wellbeing. However, a significant negative association was found between work-to-family conflict and supervisor support, job satisfaction and psychological wellbeing.

Table 1. Means, Standard Deviation and Pearson Correlation

Variables	Mean	SD	1	2	3
1. Supervisor support	3.57	0.71			
2. Work-to-family conflict	3.07	0.83	-0.24**		
3. Job satisfaction	3.38	0.77	0.30**	-0.12*	
4. Psychological Wellbeing	3.62	0.73	0.39**	-0.19**	0.42**

Note. *p < 0.05, **p <0.01, ***p < 0.001, N = 290

4.3 Hypotheses Testing

To test simultaneously for all the six hypotheses formulated in the study, SPSS PROCESS (model 4) was used to

conduct a parallel mediation analysis to test the model. This type of analysis permits us to test for the direct effects of supervisor support on employees' psychological wellbeing, work-to-family conflict and job satisfaction. Furthermore, it also enables us to test for the effect of employees' work-to-family conflict and job satisfaction on their psychological wellbeing. Lastly, it enables us to test for the indirect effects of supervisor support on employees' psychological wellbeing via work-to-family conflict and job satisfaction. The total effect of supervisor support on employees' psychological wellbeing was statistically significant (c = .397, SE = .055, t = 7.153, p < .001).

4.3.1 Supportive Supervisors' Impact on Employees' Psychological Wellbeing, Work-To-Family Conflict and Job Satisfaction

The results displayed in Figure 2 revealed that supervisor support had a significant influence on employees' psychological wellbeing, work-to-family conflict and job satisfaction signifying that supervisor support had a significant influence on several employees' outcomes. Precisely, the findings shown that supportive supervisors had a significant and positive direct effect on employees' psychological wellbeing (β = .279, SE = .056, t = 4.999, p < .001) and job satisfaction (β = .319, SE = .061, t = 5.231, p < .001). Thus Hypothesis 1 and 3 were supported. Results from Figure 2, further indicated that the support employees receive from their supervisors had a significant and negative direct effect on employees' work-to-family conflict (β = -.278, SE = .066, t = -4.190, p < .001). Hence, Hypothesis 2 was also supported.

4.3.2 Work-to-Family Conflict and Job Satisfaction as a Direct Antecedent of Psychological Wellbeing

Concerning the direct effect of employees' work-to-family conflict on their psychological wellbeing, results displayed in Figure 2 show that there was a negative direct effect of work-to-family conflict on employees' psychological wellbeing but the relationship was not statistically significant (β = -.071, SE = .046, t = -1.524, p = .128). Hence, hypothesis 4 was not supported. Conversely, employees' job satisfaction seemed to have a significant influence on their psychological wellbeing. Findings in Figure 2 indicated that employees' job satisfaction had a significant and positive direct effect on their psychological wellbeing (β = .308, SE = .050, t = 6.10, p < .001). Thus, hypothesis 5 was supported.

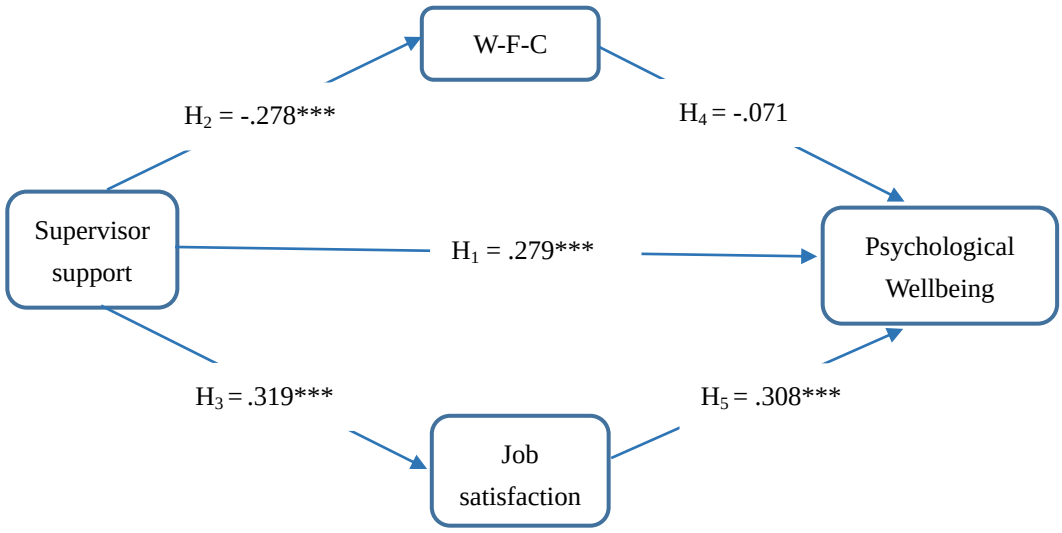

Figure 2. Parallel mediation analysis showing the effect of supervisor support on employees' psychological wellbeing as mediated simultaneously by work-to-family conflict (W-F-C) and job satisfaction

4.3.3 The Indirect Effect of Supervisor Support on Employees' Psychological Wellbeing via Work-To-Family Conflict or Job Satisfaction

Statistical significance of the indirect effects of supervisor support on employees' psychological wellbeing either through work-to-family conflict or job satisfaction was examined over 10,000 bootstrap samples with estimates taken at a 95% confidence interval. As seen in Table 2, the indirect effect of supervisor support on employees' psychological wellbeing via work-to-family conflict was not statistically significant (Effect = 0.020, CI: -0.006, 0.051). Hence, hypothesis 6 was not supported.

Conversely, the indirect effect of supervisor support on employees' psychological wellbeing via job satisfaction was found to be statistically significant. The Bootstrapped effect (with 95% confidence interval) from the table below showed that the indirect effect of the supervisor's support on psychological wellbeing via job satisfaction was statistically significant (Effect = 0.098, CI: 0.047, 0.160). Hence, hypothesis 7 was supported.

Table 2. The indirect effects of supervisor support on employees' psychological wellbeing via work-to-family conflict or job satisfaction

			95%CI	
Indirect effects	Effect	SE	LL	UL
SS → W-F-C → PWB	0.020	0.015	-0.006	0.051
SS → JS → PWB	0.098	0.028	0.047	0.160

Note. CI=confidence; LL=lower limit, UL=upper limit; Model 1 = Supervisor Support → Work-to-family conflict → Psychological wellbeing; Model 2 = Supervisor support → Job satisfaction → Psychological wellbeing.

5. Discussion

The main goal of this study was to examine the impact of supervisor support on employees' psychological wellbeing as mediated by work-to-family conflict or job satisfaction. More specifically, the first goal of the study was to test for the impact of supervisor support on employees' work-to-family conflict, job satisfaction and psychological wellbeing. The second goal was to test the effect of work-to-family conflict and job satisfaction on employees' psychological wellbeing. The last goal of the study was to examine the indirect effect of supervisor support on employees' psychological wellbeing either through work-to-family conflict or job satisfaction. Out of the seven hypotheses tested in this study, the findings provided support for five of the hypothesized relationship while the other two hypotheses (4 & 6) tested were not supported.

5.1 Summary of Findings

5.1.1 Supportive Supervisors' Impact on Employees' Psychological Wellbeing, Work-To-Family Conflict and Job Satisfaction

The study findings indicated that employees' support they receive from their supervisors played a vital role in influencing their psychological wellbeing, work-to-family conflict and job satisfaction. Regarding the direct effect of supervisor support on employees' psychological wellbeing and job satisfaction, the findings of this study confirmed that supervisor support had a significant and positive direct influence on employees' psychological wellbeing and job satisfaction. Hence Hypothesis 1 and 3 were supported. The findings of this study concur with several studies that reported that the support employees received from their supervisor had a significant and positive direct effect on their psychological wellbeing (Beehr et al., 2003; Gibson et al., 2009; Gilbreath & Benson, 2004; Gordon et al., 2019; Hämmig, 2017; Kawachi & Berkman, 2001; Rana & Javed, 2019; Willemse et al., 2012) and job satisfaction (Ahmad et al., 2019; Alegre et al., 2016; Gok et al., 2015; Karatepe & Kilic, 2007; Kula & Guler, 2014; Quresshi et al., 2018; Quresshi & Hamid, 2017; Sergeant & Frenkel, 2000). A possible reason for finding this expected results can be attributed to the fact that supportive supervisor provides guidance, assistance and feedback which assist employees to cope with complex situations that occurs in the workplace, therefore alleviating occupational stress that may negatively affect employees' psychological wellbeing and job satisfaction (Eisenberger et al., 2002). Additionally, workers may feel appreciated, respected and supported when their supervisors tend to be more supportive with them which is very crucial in increasing the degree of job satisfaction and psychological wellbeing.

Concerning the direct effect of supervisor support on work-to-family conflict of employees, the results of this analysis revealed that supervisor support had a significant and negative direct effect on employees' work-to-family conflict as expected, therefore Hypothesis 2 was supported. The findings corroborated with other previous studies (Anderson et al., 2002; Burke & Greenglass, 1999; Ford et al., 2007; Karatepe & Kilic, 2007; Kossek et al., 2011; Selvarajan et al., 2013; Talukder, 2019; Van Daalen et al., 2006). A probable reason for getting these expected results may be because supervisor support could be regarded as a form of social support that may assist employees in dealing with issues related to work-to-family conflict. Accordingly, Anderson et al. (2002) and Burke and Greenglass (1999) reported that supervisor support is seen as a form of social support that assisted employees with issues related to work-to-family conflict. Therefore, the findings of this study reinforce

literature that suggested that supervisor support was an effective way of assisting employees' to deal with their work-to-family conflict.

5.1.2 Work-to-Family Conflict and Job Satisfaction as a Direct Antecedents of Psychological Wellbeing

Hypothesis 4 stated that there will be a negative direct effect of employees' work-to-family conflict on their psychological wellbeing. The results of this parallel mediation analysis showed that work-to-family conflict did not have a significant and negative direct effect on the psychological wellbeing of employees. Therefore, this hypothesis was not supported. The findings of the study are contrary to a number of other studies (Allen et al., 2000; Frone, 2003; Hill, 2005; Kalliath et al., 2017; Lu et al., 2006; Obrenovic et al., 2020; Winefield et al., 2014) that reported that work-to-family conflict had a negative direct impact on employees' psychological wellbeing. These unexpected results may be attributed to the fact that there are several other variables that have been known to affect the psychological wellbeing of employees of which some may offset the effects of the other. For example, an employee may be struggling to deal with his or her work-to-family conflict but other aspects such as a supportive supervisor, a good relationship with co-workers, better compensation, favorable working environment, etc. could make the employee very satisfied and happy with his or her work, therefore offsetting the effect of work-to-family conflict on the employees' psychological wellbeing. To test this, a simple linear regression analysis was used to regress psychological wellbeing on work-to-family conflict only. The results showed that there was a significant and negative direct effect of work-to-family conflict on employees' psychological wellbeing ($b = -.16$, $t(288) = 25.37$, $p = 0.002$). However, regressing psychological wellbeing on work-to-family conflict, job satisfaction and supervisor support simultaneously as already shown in Figure 2, revealed that work-to-family conflict had no significant negative effect on employees' psychological wellbeing. This means that the presence of supervisor support and job satisfaction buffered or nullified the negative effect of work-to-family conflict on employees' psychological wellbeing explaining the reason for these unexpected results.

Regarding the direct effect of job satisfaction on employees' psychological wellbeing, the findings of this study confirmed that employees' job satisfaction had a significant and positive direct effect on their psychological wellbeing. Thus Hypothesis 5 was supported. The findings of this study are consistent with other studies (Bowling et al., 2010; Dirlam & Zheng, 2017; Fischer & Sousa-Poza, 2007; Karabati et al., 2019; Page & Vella-Brodrick, 2009) that reported that employees' job satisfaction was positively related to their psychological wellbeing. This is probably because job satisfaction may affect other areas of an employee's life, therefore, influencing their psychological wellbeing. A meta-analysis conducted by Faragher et al. (2005) revealed that employees' degree of satisfaction they have with their jobs affected employees' levels of burnout, anxiety, depression and self-esteem. Additionally, Dirlam and Zheng (2017) reported a significant positive effect of employees' job satisfaction on their psychological wellbeing due to its effect on employees' stress levels. Therefore we may cautiously conclude that when employees are more satisfied with their jobs, they feel less stressed therefore experiencing less anxiety, depression and burnout which is associated with improving their psychological wellbeing (Fischer & Sousa-Poza, 2007).

5.1.3 The Indirect Effects of Supervisor Support on Employees' Psychological Wellbeing via Work-Family Conflict or Job Satisfaction

Statistical significance of the indirect effects of supervisor support on employees' psychological wellbeing either through work-to-family conflict or job satisfaction showed that there was an indirect effect of supervisor support on employees' psychological wellbeing through job satisfaction and not work-to-family conflict. Thus, hypothesis 7 was supported but hypothesis 6 was not. The non-significant indirect effect of supervisor support on psychological wellbeing through work-to-family conflict signifies that supervisor support had a direct effect on employees' psychological wellbeing, therefore, confirming the findings of other studies (Beehr et al., 2003; Gibson et al., 2009; Gilbreath & Benson, 2004; Gordon et al., 2019; Hämmig, 2017; Kawachi & Berkman, 2001; Rana & Javed, 2019; Willemse et al., 2012) that found a direct effect between supervisor support and psychological wellbeing. Even though the study findings did not support this hypothesis, it provided support for similar research done by Drummond et al. (2017) who found no indirect effect of supervisor support on psychological strain via work-to-family conflict of employees in New Zealand and Australia. However, Drummond et al. (2017) rather found an indirect effect of supervisor support on psychological strain via work-to-family conflict among employees in China and Hong Kong signifying that national differences could be the reason for finding these unexpected results.

However, concerning the indirect effect of supervisor support on employees' psychological wellbeing via job satisfaction, the study findings indicated that there is a significant indirect effect of supervisor support on

employees' psychological wellbeing via job satisfaction. The findings further revealed that supervisor support increases the degree of job satisfaction of employees which in turn improves their psychological wellbeing. As predicted by previous studies on one side that supervisor support increases the degree of job satisfaction of employees (Alegre et al.,2016; Galletta et al., 2011; Kula & Guler, 2014; Willemse et al., 2012) and on the other side that job satisfaction also increases the psychological wellbeing of employees (Bowling et al., 2010; Fischer & Sousa-Poza, 2007; Page & Vella-Brodrick, 2009), it was not surprising that the results indicated that job satisfaction mediates the relationship between supervisor support and psychological wellbeing. According to Eisenberger et al. (2002), a supportive supervisor provides guidance, assistance and feedback to employees. This support helps employees to deal with any occupational stress associated with their jobs, making employees more satisfied which may, in turn, be associated with less anxiety, depression and burnout hence improving their psychological wellbeing.

5.2 Theoretical and Practical Implications

Theoretically, the study findings offer several contributions to academic literature in this field. Previous studies (Beehr et al., 2003; Gibson et al., 2009; Gilbreath & Benson, 2004; Gordon et al., 2019; Hämmig, 2017; Kawachi & Berkman, 2001; Rana & Javed, 2019; Willemse et al., 2012) have suggested models that hypothesize that supportive supervisors have a significant influence on employees' psychological wellbeing. This study findings seem to be applicable as it reveals that support that employees receive from their supervisors plays a significant and positive impact in influencing their psychological wellbeing. Moreover, the study findings also provide supports to literature (Ahmad et al., 2019; Alegre et al., 2016; Gok et al., 2015; Karatepe & Kilic, 2007; Kula & Guler, 2014; Quresshi et al., 2018; Quresshi & Hamid, 2017; Sergeant & Frenkel, 2000) that accentuated that supportive supervisor may have a significant and positive effect on employees' job satisfaction. The current study revealed that supervisor support had a significant and positive influence on determining the level of employees' job satisfaction. Lastly, the study findings further provide support in enlightening us on the relationship between employees' job satisfaction and their psychological wellbeing. This study seems to be consistent with academic literature (Bowling et al., 2010; Dirlam & Zheng, 2017; Faragher et al., 2005; Fischer & Sousa-Poza, 2007) that accentuated the significant role of job satisfaction on employees' psychological wellbeing. The study findings indicated that employees' satisfaction with their jobs had a significant influence on their psychological wellbeing.

Practically, the results of this present study have significant implications for organizational management, especially for supervisors. The study findings may help organizations in understanding the benefits of supportive supervisors on employees' outcomes in several ways. First, the findings will help organizations who are interested in improving their employees' wellbeing to invest in training their supervisors to be more supportive as this study results indicated that supportive supervisors improve employees' psychological wellbeing. Additionally, increasing supportive supervisors in the organizations could increase employees' job satisfaction which is advantageous for organizational performance and productivity. The current study also revealed that supportive supervisors could help employees' to deal with work-to-family conflict. Furthermore, increasing supportive supervisors could increase employees' levels of job satisfaction which in turn improves their psychological wellbeing. This study demonstrates how significant it is for organizations to invest in training their supervisors to be more supportive in order to improve employees' job satisfaction and psychological wellbeing and to decrease employees' work-to-family conflict.

5.3 Limitations and Future Research Directions

The current study as other studies is not without weaknesses. First of all, our research design used in this study is a cross-sectional study. According to Mitchell and Maxwell (2013) conducting a mediation examination using a cross-sectional study often affirms a mediating role by overemphasizing a secondary path through a variable of study which may not be so in multi-wave designs or longitudinal studies. Therefore, making it difficult to conclude causality. Hence, future studies should take this into consideration and conduct studies using a longitudinal or multi-wave design in order to bring to light in-depth information about the stability and changes of study variables over time. Another weakness of our study is the use of a self-reported survey. According to Podsakoff, MacKenzie and Podsakoff (2012), one weakness of self-reported surveys is the tendency of response bias from participants as some participants may overstate or belittle their responses leading to the likelihood of common method biases. Hence, future studies could use other forms of data collection methods such as interviews or multi-rater surveys to avoid this limitation.

6. Conclusion

In conclusion, this study contributes to the understanding of the effectiveness of supportive supervisors in

organizations. More specifically, it focuses on the significance of supportive supervisors on employees' psychological wellbeing, work-to-family conflict and job satisfaction in different ways. First of all, the current study enlightens organizations and practitioners on the extent to which supervisor support is directly related to employees' psychological wellbeing, work-to-family conflict and job satisfaction as the study findings demonstrated that supervisor support had a significant direct effect on employees' work-to-family conflict, job satisfaction and psychological wellbeing. Secondly, this study further provides insights on supportive supervisors and employees' psychological wellbeing via job satisfaction. The study findings suggest that if employees are exposed to supervisors that are very supportive, their job satisfaction will increase which will in turn lead to improved psychological wellbeing of employees.

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The Influence of Allocating the Residual Value of MSMEs' Cluster on the Growth of MSMEs and the Cluster Based on the Theory of Structural Hole

Suo Lu[1]

[1] Lecturer, Doctoral Program of Stamford International University, Thailand

Correspondence: Suo Lu, Doctoral Program of Stamford International University, Rama 9, Bangkok, Thailand.

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Abstract

The objectives of this research were to explicate the influence mechanism between MSMEs and MSMEs' clusters; to explicate the generation mechanism of cluster residual value, and to determine whether there is a significant effect of structural hole on allocating the residual value of MSMEs' cluster.

The research was designed as quantitative research and used survey questionnaires to collect data from 475 entrepreneurs or senior managers of MSMEs. After passing the validity (KMO) and reliability (Cronbach's Alpha) tests, the correlations between independent and dependent variables have been examined by Pearson Correlation. Then One-Way ANOVA was employed for further specifying the causal direction of correlation between variables. The findings of this research showed that there are positive correlations between cluster's value and growth of MSMEs; between structural hole and allocation of cluster's residual value; between structural hole and growth of cluster. In addition, structural hole as a moderating variable effect on the relationship between cluster's value and growth of MSMEs significantly.

Keywords: cluster's residual value, enterprise cluster, MSMEs, Relationship network, structural hole

1. Introduction

Enterprise cluster is a group of independent and interdependent member enterprises that maintain long-term non-specific contracts according to the division of labor, resource complementation, and on the basis of human factors such as trust and commitment. (Porter, 1998). Based on this understanding, MSMEs' cluster could be considered as in a specific field, a collection of a large number of interconnected Micro, Small and Medium-sized Enterprises and related supporting institutions with a leading industry as their core business.

With the globalization of market competition, economic development also highlights the trend of regional centralization, particularly on the local enterprise clusters who are participating in the division of labor in the global industrial chain. The prosperity of Silicon Valley, the revival of the Italian economy, and the rapid development of the eastern coastal towns of China are largely attributed by the development of local enterprise clusters. The clusters of MSMEs have been developing rapidly due to its ability to adapt to market changes and meet the personalized needs of customers. The cluster development of MSMEs is an important economic phenomenon in the world, the MSMEs' clusters in China also achieved a booming development in the 1990s, an obvious huge economic and social benefits brought by MESMs' clusters are increasing. Therefore, deeply analyzing the economic phenomenon of MSMEs' Cluster has great significance to promote regional economic development and social progress.

As a major subject group of micro-economic, MSMEs is playing a more and more important role in economic and social development, nowadays. In both developed and developing countries or different economics areas, there are a large number of MSMEs, which play a significant role in promoting local economic and social development. Thus, the development of MSMEs is valued and supported by the government. According to the world bank (2019), Formal MSMEs contribute up to 60% of total employment and up to 40% of national income (GDP) in emerging economies, and these numbers are significantly higher when informal MSMEs are included. In 199 economies areas of the world, there are about 322.4 million formal MSMEs, which employs more than 1 billion employees. (MSME-CI, 2019).

Until 2019, more than 23,280,000 MSMEs have been registered in China, accounting for 99% of the total number of Industrial and Commercial registration. MSMEs contributed 60 percent of China's GDP, 50 percent of tax revenue, and 80 percent of urban employment. In addition, MSMEs supported more than 65 percent of China's invention patents, 75 percent of enterprise technological innovation, and 80 percent of new product development (Chinabgao, 2019). MSMEs have become the main force to promote the sustained and rapid development of China's economy.

To take a panoramic view of the successful MSMEs in various countries, most of them with fast development, good benefits, and strong vitality do not exist sporadically, but come together in a cluster and benefit a lot from the powerful cluster's effect. Such as the textile industry in northern Italy, the wine industry in California, the IT industry in Silicon Valley, and the automobile industry in Japan. The local economic development in China is also inseparable from the contribution of MSMEs' clusters, such as the leather and shoe industry in Wenzhou, the computer information industry in Dongguan, and textile industry in Foshan.

1.1 Problem Statement

The cluster of MSMEs is playing a key role in the new economic structure of China. However, it is still difficult for most MSMEs to draw benefit from the cluster they are in. Although many scholars have discussed the enterprise cluster from different perspectives in previous studies, there is still a large gap in the study of cluster residual value distribution from the perspective of structural hole managing and optimizing. In the previous researches about enterprise cluster, both of the knowledge school represented by Penrose (1995) and the evolutionary economics school represented by Nelson and Winter (1982) tend to believe that the core advantage of an enterprise in the production process is not simply to avoid transaction costs, but the unique advantage of controlling a particular economic activity logically that quite different from the market behavior. Chen (2003) first proposed the concept of residual value of Cluster, but it refers to an individual enterprise within a cluster rather than the cluster as a whole, and the "residual value of Cluster" is defined as the extra benefit that an enterprise can achieve by joining a cluster than by not joining. Li and Yang (2005) pointed out that cluster residual value is the residual effect of an enterprise joining or not joining the cluster on the cluster itself. Chen and Wu (2005) argued that the benefits and costs of a cluster can be as tools for analyzing the cluster residual value. Although this finding is further analyzed the residual value of cluster itself than others, it is still based on whether an enterprise joins a cluster and how much the residual value of the cluster it can get if it does.

Based on the research gap, there are three problems could be summarized as below:

1) The analysis of producing cluster residual effect is insufficient.
2) The allocation mechanism of cluster residual value is lack of researches.
3) The influence of cluster internal network on cluster residual value is lack of researches.

1.2 Research Objective

In order to clearly understand the relationship between MSMEs and MSMEs' cluster and the allocation mechanism of cluster residual value, the research objectives of this research are set as below:

1) To explicate the influence mechanism between MSMEs and MSMEs' cluster.
2) To explicate the generation mechanism of cluster residual value.
3) To determine whether there is a significant effect of structural hole on allocating the residual value of MSMEs' cluster.

1.3 Conceptual Framework

The conceptual framework was developed from the literature review on structural hole, enterprise cluster, and cluster residual value. According to Foghani, Batiah, and Rosmini (2017) and many other scholars' studies, the clustering of MSMEs has been an inevitable trend of economic development in different economic areas. MSMEs clustering can not only distribute more benefits to MSMEs than they are individually in the market, but also can more in line with the higher efficient division of labor pattern required by global economic integration.

Although the cluster provides more value to its MSMEs, still many MSMEs are difficult to survey and grow in the fierce market competition. Therefore, this paper introduced the theory of structural hole to discuss the influence of residual value of MSMEs' cluster on the relationship between the growth of MSMEs and the cluster

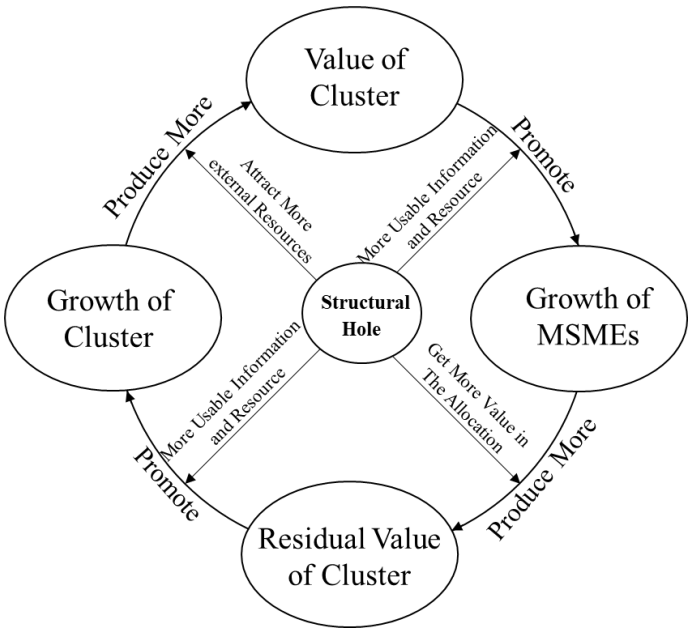

Figure 1. The Influence of Structural Hole on The Relationship Between MSMEs and MSMEs' Cluster. (developed by the author)

Enterprise is not an isolated unit it cannot exist without connection with other organizations or individuals. Therefore, an enterprise in a cluster is in two different networks at least. One is the tight internal network of the cluster, and the other one is the loose external social network relatively. Coleman (1990) noted that the tight network can generate cohesion, which can relatively make the high trust among network members, and the network emphasizes the common behavioral norms and concerted actions, which are conducive to the information sharing of network members and the common defense of risks.

However, Burt (1992) argued that the tight network could make its members all have the same or similar information, which causes a lack of information diversity and redundancy information among the members. As a result, the value of this network is reduced. The information that exists in the structure hole is likely to heterogeneous and non-redundant, which ultimately can bring the structure hole owner to have more value than other members in this network. Moreover, Burt (2004) argues that "opinion and behavior are more homogenous within than between groups, so people connected across groups are more familiar with alternative ways of thinking and behaving…" (pp. 349–350). In tightly networked clusters of people, discussion of redundant information is likely to be prevalent, therefore, the holes around and between these tight networks where an individual is also likely to find the greatest benefit in bridging the structural hole to another individual and/or network to access non-redundant information and/or resources. (Cowan & Jonard, 2007). Therefore, Figure 1 illuminated that the value of cluster can help its member enterprises to develop, but only those who occupied structural holes in networks can obtain more resources and more competitiveness, so as to achieve faster growth. (Suo, 2019).

Enterprises exist in an uncertain cluster network and the agreements in the cluster network are unperfect, thus the profits of enterprises from the cluster network are not a constant, which is affected by the uncertain factors of enterprises themselves. The behaviors of organizations in the cluster, including enterprises, governments, intermediaries, and other investors, could have external influences inevitably. Therefore, they can't get a predictable fixed reward for their investment. As a result, as the figure 1 showed, a mature enterprise that occupied structural holes will tend to attract more enterprises to enter the cluster, and guide other enterprises in the cluster to invest in the cluster network and creating more residual value of the cluster because they can obtain more benefits in the process of allocating cluster's residual value by the structural holes they occupied.

Since the residual value of the cluster increases, it not only that the member enterprises can get more benefits, but also attract more enterprises to join the cluster, thus it promotes the growth of the cluster, as figure 1 demonstrated. In this process, the cluster can be considered as a node in a social network. The structural holes that the cluster occupied are the cluster's member enterprises occupied in the social network. Therefore, the cluster can get more usable information and resources to support its growth from these structural holes.

During the cluster is growing up, the structural holes that it occupied in the social network can provide more resources to help to produce more value for its member enterprises. Finally, as figure 1 illustrated that the structural hole can help the cycle running positively.

Based on the above analysis, this paper proposes the following 4 hypotheses.

H_1: There is a significant relationship between cluster's value and growth of MSMEs.

H_2: There is a significant moderating effect of structural hole on the relationship between cluster's value and growth of MSMEs.

H_3: There is a significant relationship between structural hole and allocation of cluster's residual value.

H_4: There is a significant relationship between structural hole and growth of cluster.

2. Literature Review

2.1 Enterprises' Cluster and Cluster's Value

Scholars have different views on enterprise clusters from different perspectives: Becattini (2002) believes that enterprise clusters are the geographical gathering of companies and institutions that form interconnections in a particular industry. Humphrey and Schmitz (2002) believe that the enterprise cluster is the geographical concentration of enterprises' departments. A cluster can make an enterprise gain benefits that a single enterprise cannot get, which comes from collective efficiency. Van Dijk and Rabellotti (1997) consider enterprise clusters to be a group of enterprises that are close in spatial location and specialize in producing the same or similar products. Porter (1998) defines the concept of enterprise cluster as: "A geographical cluster of interconnected enterprises and institutions in a particular field. Clusters include a range of related industries and other competition-related entities, such as suppliers of components, machinery, equipment and services, suppliers of specialized infrastructure, etc. Clusters also tend to extend downstream to sales channels and customers, and horizontally to manufacturers of complementary products that are technically or technically related or have a common investment Products. In addition, many clusters also include government and other institutions for training, education, information, research, and technology." Uzor (2004) believes that enterprise clusters are small enterprises that provide similar products or services and operate in the same place. They cooperate and compete with each other, learn from each other, formulate common strategies to meet external challenges, and expand the market through the development networks.

According to the conceptions of value chains and value networks, enterprise clusters' value chain can be expressed as a special weighted flowing chain composed of nodes and arcs. (Zhao, 2008) Nodes refer to various actors, including enterprises, governments, universities, scientific research institutions, intermediary organizations, etc. Arc refers to the link connecting exchanges, transactions, or cooperation among nodes, including various input-output links, service links, sales links, joint research links, cooperative development links, etc. weighted flowing chain refers to the material, knowledge, information, etc. flowing on the arc. The value network of enterprise cluster refers to the intricate network system formed by the vertical and horizontal connection between different value chains in the cluster. The enterprise cluster value network inherits the element structural characteristics of the enterprise cluster value chain and forms a new kind of directed graph with special empowerment. The enterprise cluster value network is similar to the general network in that it is also composed of nodes and arcs, with inflows and outflows (or input and output) at the nodes, and flow at the arcs. The difference is that the nodes in the value network of enterprise clusters are not the same, they could be enterprises, intermediaries, research institutions, etc. The process of inflow and outflow at each node is the process of value creation or value appreciation at the node. The amount of inflow and outflow at each node is generally different. After passing a node, the material, knowledge, or information will change.

Therefore, based on the context of enterprises' cluster and cluster' value, enterprises as nodes embedded in the network of a cluster. The capital value of the cluster is the total amount of fluid substances on the arc, like information, knowledge, relationship benefits, etc. Enterprises or individuals in the cluster's network, they produce these fluid substances and also get benefit from it. As a result, the working efficiency of a cluster is dependent on the amount of fluid substances and the utilization ratio.

2.2 Structural Hole

Structural hole is a concept from social network research, originally developed by Ronald Stuart Burt. (Burt, 1992). Burt introduced this concept in an attempt to explain the origin of differences in social capital. Burt's theory suggests that individuals hold certain positional advantages or disadvantages from how they are embedded in neighborhoods or other social structures. A structural hole is understood as a gap between two

individuals who have complementary sources to information. Structural holes exist in social networks when there is a lack of direct contact or tie between two or more entities (Burt, 1992). The theory of structural holes was developed to explain how to benefit from competition in social networks and their intersecting relationships (Burt, 1997). Burt took the perspective of how does a player gain competitive advantages in the competitive arena as the starting point of the research, and pointed out the social structure of the competition arena is the key factor to influence the rate of return on investment. However, homogeneous and reduplicative networks cannot lead to a social capital increase, therefore, the theory of structure hole was forming for explaining this question. Structural holes differ from "weak ties as bridges" as described by Granovetter (1973, p. 1065) in that it is not about the strength of the relationship between two entities but rather about the "chasm" or lack of a tie between entities (Burt, 1992).

The structure hole can be described as the phenomenon that one or some individuals in the social network have a direct connection, indirect connection, or disconnection with other individuals in the social network. As shown in figure 2.1, the network has four participants in A, B, C, D, of which there are no links among B, C, and D, but they are associated with A respectively. Thus, an occupied the central position in the network, the other three participants must pass A to connect each other, so A occupied three structural holes of BC, BD, and CD, as a result, an obtain competitive advantages. Obviously, the structural hole is a chasm among the non-redundant contacts; it is a buffer, just like an insulator in a circuit.

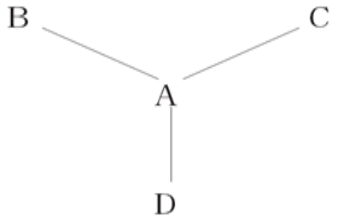

Figure 2.1. Structure Hole Illustrating (designed by author)

Because of structure holes, the contacts on both sides of the hole can bring cumulative rather than overlapping network benefits to the structure hole occupier. This includes information benefits and control benefits. The information benefit is realized mainly by access, timing, and referral. The controlling benefit refers to the fact that a third party can bridge between the two parties and decide which one should be taken into consideration first. Information is undoubtedly the essence of controlling benefits. This is similar to Simmel's idea of Tertius Gaudens. As Burt (2001) said, thoughts and behaviors of in-group members are more homogeneous than out-group members are, so people across groups are more familiar with alternative thoughts and behaviors to gain more choices and opportunities. The advantage of such thoughts and opportunities is the mechanism of brokerage becoming to social capital.

At present, when scholars in different fields use social network analysis to study network structure, the measurement of network structure is mainly divided into three levels, which are single enterprise, enterprise cluster, and the complete social network. (Suo, 2019). In the first level, scholars study a single enterprise in the form of network nodes. The centrality of network location is often selected as the measurement index of the competitiveness and the growth of an enterprise. In the second level, the link relations among industries or organizations within one industry are the core research content. Scholars study the positions of enterprise clusters or industries in the network and take network span, structure hole, and network heterogeneity as the test indexes for enterprises to acquire knowledge resources and improve their competitiveness. The third level research extends further to the overall social network. This is a more macroscopic perspective, which usually takes network density and network scale as the measurement indexes of the social network structure and the development of a society.

Due to this research focuses on the influence of structural hole on the growth of enterprises, allocation of residual value, and the cluster's development, the analysis is at the first and second levels. If an enterprise or a cluster in the position of a network bridge, it can not only have access to more information resources, which are not easily accessible by other network members, but also can obtain more heterogeneous resources. At the same time, it can control the flow direction of the network benefits.

2.3 Residual Value of Cluster

In a cluster network, an individual or an organization can't obtain a predictable fixed reward for its investment behavior, and this investment behavior itself will have an external impact. (Hu, Wang, & Wang, 2010) Hence, from the perspective of network relationship, the cluster's residual value reflects the total value of individual or organizational behavior, which is the sum of the value newly created by the members in the cluster. It is the value-added gained by individuals or organizations themselves and the value-added brought to other individuals or organizations. This view of residual value reflects the nature of cooperation and complementarity among individuals or organizations in the cluster network, sharing the risks and the benefits of the cluster development.

According to (Hu, etc., 2010), assumptions in the cluster network, the benefit of investment of an enterprise (i) in the cluster network to the enterprise itself is R_i; The benefit brought to individuals (including free workers) in the cluster network is w The revenue to the local government is R; The income brought to other enterprises, such as enterprise (j), is R_j, the total amount of residual value (R) of the whole cluster is:

$$R=Ri + w+ r + Rj. \quad \textit{(Formula 1)}$$

In formula 1, the amount of residual value R could be negative, it means someone in the cluster or the whole cluster has to take this deficit. It is assumed that the behavior of the enterprise's investment in the network has no external impact on the cluster, that is:

$$R = R_i. \quad \text{(Formula 2)}$$

The enterprise's investment behavior only generates the residual value for the enterprise, that is, the cluster residual value is the enterprise's residual value. If the behavior of enterprise (i) investing in the network does not bring any impact to the government and individual operators, namely the external economy only affects the enterprise, such as technology shift between enterprises, the formula 1 is:

$$R=R_i + R_j \quad \text{(Formula 3)}$$

In the cluster network, the investment behavior of enterprise i will inevitably bring uncertain influence to other enterprises in the network, it means there is a positive or negative impact on other enterprises in the cluster, then the formula can be expressed as:

$$R=R_i + R_{j1} + \dots + R_{j(n-1)} \; 1< j \leq n \quad \text{(Formula 3)}$$

In the cluster, if the regional market of the cluster is fixed, assuming that the future demand Q of the whole cluster is constant and the price P is fixed, then the revenue R of the whole cluster is fixed. Any enterprise can only share a variable reward if it cannot get a fixed reward for its input. Suppose the share ratio of enterprise (1), enterprise (2), … , enterprise (n) are β_1, β_2, … , β_n, and $\beta_1+\beta_2 \dots +\beta_n=1$, in which the residual value that the enterprise (i) can get from the cluster is：

$$R_i=\beta_i R. \quad \text{(Formula 4)}$$

When enterprises are located in different positions in the cluster network, their β values are different, so the residual value of the clusters allocated is also different. Generally, enterprises with a better location of structural holes can allocate more surplus value.

3. Research Methodology

The research design for this research was designed as quantitative research adopting survey questionnaires to collect the data from respondents who are entrepreneurs or high-level managers of MSMEs in China. The methodology of this research was designed on the basis of the available literature and practices of scholars, which is very important for appropriate research methods to obtain effective and reliable findings. It aims at reaching the objectives of this study.

In order to test the research hypothesis, a quantitative research design was employed to collect the primary data with questionnaire survey from 486 entrepreneurs or high-level managers of MSMEs. In this paper, KMO and Cronbach's Alpha was employed for testing the validity and reliability of all scale factors and variables. Pearson Correlation was adopted for testing the correlations between variables, and employing One-Way ANOVA to further specifies the direction of correlation and studies whether there is a causal relationship between variables.

3.1 Population and Sample Size

There are 23,280,312 MSMEs have registered on State Administration for Market Regulation. (SME Finance, 2019). Therefore, the sample size for the study is 400 derived from Taro Yamane formula (1967), but for more convenience and to protect from the incomplete questionnaire, the researcher used 500 samples in this research for easy computation.

3.2 Data Collection

In order to avoid possible misunderstandings caused by different personal cognition about our designed questions, we distributed questionnaires in designated groups which formed by entrepreneurs or high-level managers of MSMEs, such as SME co-operation working places, entrepreneur social communities, activities, and meetings of "start-ups and innovation", and part-time MBA programs in universities.

3.3 Reliability and Validity Tests of Questionnaire Design

The questionnaire was tested with 30 people who are entrepreneurs or high-level managers of MSMEs, and they were not in the sample group. The reliability value was calculated by using Cronbach's alpha to ensure whether there was internal consistency within the items. The Alpha value of this pilot test was 0.918, it indicated that the questionnaire of this research was highly reliable.

The index of item-objective congruence (IOC) is adopted in this study to test development for evaluating content validity at the item development stage (Rovinelli, & Hambleton, 1977). The result of the IOC test was 0.745, the designed questions of this research are acceptable.

4. Research Findings and Analysis

4.1 Descriptive Analysis Results

This research focuses on MSMEs in China, all data from 25 large size enterprises of 500 samples had been deleted, as a result, the total valuable sample number is 475. The findings from this research illustrated that the majority of the respondents were male 54.8 percentage and female 45.2 percentage. The rate of female and male are not nearly balanced that could be caused by the survey target population is entrepreneurs or high-level of MSMEs. In addition, there are around 95.2 percent of respondents are entrepreneurs or high-level managers and having more than three-year working experience in their enterprise.

4.2 Validity and Reliability Tests

The validity test of this study is based on factor analysis. KMO is adopted to examine whether the collected data of this research are suitable for factor analysis, and to estimate whether the different measurement items under the same variable can reflect the characteristics of the measured variable more accurately.

The reliability test is a measurement method used to check whether the data from the questionnaire survey has consistency or not, which usually employ Cronbach's Alpha to test the consistency coefficient.

Table 1. Validity and Reliability Test Result

Factors	Alpha	KMO	Sig
Cluster's Value	.951	.915	.000***
Structural Hole	.983	.985	.000***
Growth of MSMEs	.956	.918	.000***
Allocation of Cluster's Residual Value	.962	.917	.000***
Growth of Cluster	.956	.912	.000***
All Scale Factor (25 Items)	.973	.979	.000***

Sig <0.05

The results of Table 1 revealed that all data of Independent Variables (Cluster's Value and Structural Hole,), Moderating Variable (Structural Hole), and Dependent Variables (Growth of MSMEs, Allocation of Cluster's Residual Value, and Growth of Cluster) have high validity and reliability. Thus, correlation and regression analyses can proceed.

4.3 Correlation and Regression Analysis

As the premise of regression analysis, Pearson Correlation is used to preliminarily judge whether the interaction and influence between variables exist and whether the hypothesis is valid in this research.

One-Way ANOVA as regression analysis in this paper is to further specify the direction of correlation and studies on whether there is a causal relationship between independent and dependent variables.

Table 2. Coefficients of Correlation and Regression between Variables

IV	DV	Person Correlation Coefficient	Adjusted R^2	F	t	Standardized Coefficients Beta	Sig.
CV	GM	.852	.725	112.036	32.816	.852	.000
SH	ACRV	.901	.812	108.642	41.980	.901	.000
SH	GC	.918	.842	126.991	46.713	.918	.000

Sig < 0.05

Annotation: IV is Independent Variable; DV is Dependent Variable; CV is Cluster's Value; SH is Structural Hole; GM is Growth of MSMEs; ACRV is Allocation of Cluster's Residual Value; GC is Growth of Cluster.

Table 2 shows that the two-tailed test the correlations between independent and dependent variables are all at significant level (error-tolerant < 0.01). Values of Pearson Correlation are greater than 0.8, which indicates that there are high degrees of correlations between independent variables and dependent variables. As a result, hypotheses H_1, H_3, and H_4 were accepted. Moreover, according to the coefficients of Adj.R^2, there are high explanations percentage from cluster's value to the growth of MSMEs; from structural hole to allocation of cluster's residual value; from structural hole to growth of cluster. The standardized coefficients Beta here indicate that H_1, H_3, and H_4 were accepted with positive relationships.

4.4 Effective Test of Moderating Variable

The effectiveness of the moderating variable can be analyzed by the method of variable standardization that is introduced in Aiken and West (1991). The variable standardization is a technique of mean centering, the purpose of it is to avoid the collinearity. After the regression analysis between the independent variables and the dependent variables under conditions of high and low score groups of the moderating variable, the influence result of the moderating variable on the relationship between the independent variables and the dependent variables can be presented. (Kraemer & Blasey 2004). Table 3 shows the results of regressions on dependent variable (growth of MSMEs) into z score of independent variable (cluster's value); into z score of moderating variable (Structural hole); into the multiplication of z score of cluster's value and z score of structural hole.

Table 3. Regressions between Z Score of Variables

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	3.470	.031		112.542	.000		
	Zscore(CV)	1.013	.031	.852	32.816	.000	1.000	1.000
2	(Constant)	3.470	.025		141.137	.000		
	Zscore(CV)	.483	.042	.406	11.386	.000	.336	2.973
	Zscore(SH)	.650	.042	.547	15.319	.000	.336	2.973
3	(Constant)	3.508	.035		100.219	.000		
	Zscore(CV)	.463	.044	.390	10.444	.000	.307	3.260
	Zscore(SH)	.638	.043	.536	14.782	.000	.324	3.084
	CVxSH	.246	.031	.405	1.509	.000	.593	1.686

a. Dependent Variable: GM

Annotation: CV is Cluster's Value; SH is Structural Hole; GM is Growth of MSMEs.

All z scores of variables are at significant level (< 0.05), which means the effect of moderating variable (Structural Hole) was significant. Therefore, hypothesis 2 was accepted. The following figure 4 shows the comparison of the regression effect of the high-value and low-value grouping of the moderating variable on the relationship between independent and dependent variables.

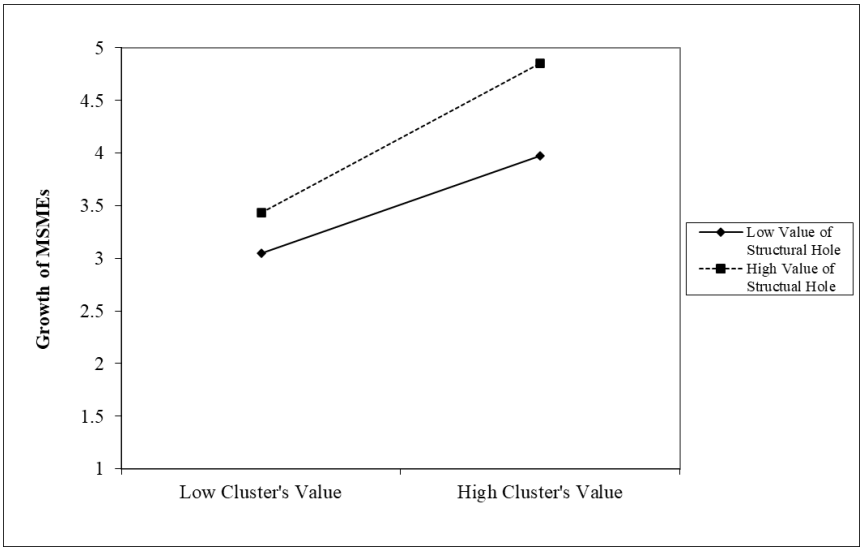

Figure 4. Comparison of regression effects of different groupings of moderating variable

The figure 4 displayed that the slopes of two lines are different obviously, which means the effects of Structural Hole as moderating variable on the correlation between the independent variable (Cluster's Value) and dependent variable (Growth of MSMEs) are different with high and low value groups of cluster's value. It demonstrated the effect of the moderating variable is significant, and the H_2 was accepted.

To sum up, after reliability, validity, correlation, and regression analyses, a conclusion can be drawn that hypothesis 1, 3, and 4 were accepted with positive correlations. In addition, by the z score variables regression analysis, hypothesis 2 was accepted.

5. Research Contribution

5.1 Contribution to Knowledge

This research discussed the relationship among cluster's value, growth of MSMEs, allocation of residual value, and growth of cluster, it revealed an intrinsic value of cluster's network, providing a new perspective of innovation for future research. According to the findings of this research, it expounded that the differences of cluster's residual value allocation could be influenced by the structural hole significantly, and because of it, the structural hole also has moderating effect on the relationship between cluster's value and growth of MSMEs. On the premise that there are positive correlations between structural hole and enterprise growth, and between enterprise growth and cluster growth, this paper verifies that there is also a positive correlation between structural hole and cluster growth, and provides a valuable theoretical perspective on the development of MSMEs and MSMEs' cluster. Moreover, by the analysis of the cluster's residual value allocation, this study also provides a theoretical reference for the Cluster's MSMEs in how to occupy and use structural hole to gain more residual value of the cluster. To compare with previous studies, this research presents a new perspective on the development of cluster based on its internal network, which could help MSMEs to utilize of the residual value of the cluster maximumly, so as to obtain the growth of MSMEs and the cluster.

5.2 Contribution to Practice

In daily social communicational activities, enterprises should focus on expanding the scope of their social circle and network, and devote the time and the energy to establishing connections with individuals and social groups at different levels and fields, such as governments, media, and financial institutions. MSMEs should constantly look for structural holes in their networks, dig unique resources, and enrich new knowledge by participating in market and non-market activities. Entrepreneurs should also focus on selecting the "primary contacts" who are most important to the relationships and use them to gain access to a wider range of internal and external network of the cluster. This approach could improve the efficiency of relationship connection and maintain a balance among connections, which could be differentiation, decentralization, and clusterization. Moreover, in order to identify the relationship that can really bring innovation opportunities, MSMEs should consciously sort out connections with different levels in the relationship network at ordinary times. If the structural hole is in an active position, the enterprise can use the structure hole to seize the usable and valuable resources, otherwise, if it is in a passive position, such as the number of structural holes is not enough or very lack, the enterprise also should actively "create" opportunities for enriching its value.

Furthermore, the dynamic change is accompanied by growth, management, thus, optimization and reconstruction of the structure hole are important for MSMEs in relationship management. MSMEs could have to reach the different needs for its survival and development by the dynamic adjustment of structural holes with different characteristic forms, diversity, and heterogeneity. On the one hand, MSMEs need to get rid of their own existence of various business difficulties, must proceed from the individual entrepreneur and employees, who should have a good performance on innovation, marketing strategy, satisfying customer needs, winning in the competitive market, and obtaining sustainable profits. On the other hand, when the enterprise is faced with the current situation of limited knowledge and marketing practice, and the effect of weakening from competitors, it should flexibly use the occupied structural hole in the cluster's network to explore better and richer benefits of the cluster. In the process of construction and maintenance of individual relationship networks, MSMEs need to pay more attention to searching structure holes in the network of different groups.

Clusters should also initiatively enhance the connections strength, the relevance, and the heterogeneity of the related networks, and enable differentiated networks' members to communicate and interact each other more closely and smoothly, which could help the cluster to reinforce the advantages of obtaining and controlling usable sources, so as to improve the level of innovation. At the same time, MSMEs should pay attention to prevent the disadvantageous situation that informal organizations and closed networks could disintegrate their structure hole. There are many ways, such as optimizing, eliminating, and reconstructing their redundancy relationship, which the enterprise could adopt to expand the diversity of its relationship network, explore and identify new potential opportunities, coordinate internal and external related parties, and rebuild the trust and the reputation in the market. Thus, the positive circulation as figure 1 described can run efficiently.

5.3 Limitation and Future Research

This study mainly focusses on the research about the influence of allocating the residual value of MSMEs' cluster on the growth of MSMEs and the cluster, however, with the development of the social economy and globalization, more and more enterprises clusters participate in the division of labor in the industrial chain, hence, more new functions of clusters are formed in the market nowadays, which could be studied in the future research. Moreover, the functions of cluster also could be deeper analyzed from the perspective of closed and opened internal network. In addition, allocation of residual value of cluster is touched upon in this study, which could be also deeper analyzed from the angle of creation and transfer in the future study. Although it is nearly impossible for one enterprise to occupy all structure holes in a network, the structure holes can help MSMEs to acquire more usable and valuable resources. However, too many redundancy structure holes could cost too much energy and reducing the work efficiency of MSMEs for maintaining them. Thus, how to optimize the relationship network and structure holes' location could be studied in the future.

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Behavioural Finance and Investment Decisions: Does Behavioral Bias Matter?

Etse Nkukpornu[1], Prince Gyimah[2], & Linda Sakyiwaa[3]

[1] Department of Accounting and Finance, Christian Service University College, Kumasi, Ghana

[2] Department of Accounting Studies Education, University of Education, Winneba, Kumasi-Campus, Ghana

[3] Finance Department, Kumasi Technical University, Kumasi, Ghana

Correspondence: Etse Nkukpornu, Department of Accounting and Finance, Christian Service University College, Kumasi, Ghana.

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Abstract

This paper examines the nexus between behavioural bias and investment decisions in a developing country context. Specifically, this study tests the effect of four behavioural biases (overconfidence, regret, belief, and "snakebite") on investment decisions. Descriptive statistics and inferential statistics including multiple regression are used to examine the behavioural biases-investment decisions nexus. The study reveals that the four bias have a significant positive and robust relationship with investment decision making. The result also shows that the "snakebite" effect contributes more to the decision making, followed by belief bias then regret bias. Overconfidence bias, however, contributes the least effect on investment decisions. Our contribution confirms the prospect theory and that behavioural bias influences investment decisions in the developing country perspective.

Keywords: behavioral Finance, behavioural bias, investment decisions, finance, developing countries

1. Introduction

Investors for many years depends on the modern financial theories and expert opinions in making investment decisions to maximize returns either in the short term or long term. Finance theories and models such as Capital Structure (Modigliani & Miller, 1958); Capital Asset Pricing Model (Sharpe, 1964; Lintner, 1965, and Mossin, 1966); Efficient Market Hypothesis (Fama, 1970); and Options Pricing model (Black and Scholes, 1973) postulated that investors are rational, and they base on available information in making decisions. Chin (2012) suggested that the logical nature of investors in decision making could not explain the volatile nature of the stock market because of some behavioural biases. Thus, the finance theories regarded these as irrelevant. However, the collapse of the deep-rooted institution such as Long Term Capital Management companies (LTCM) due to stock market changes indicates that something was wrong with modern financial theories (Prosad et al., 2015). Nofsinger and Varma (2014) added that these anomalies delineate that something was lacking in the contemporary theory of rationality.

Henceforth, Kengatharan (2014) argued that investors do not behave rationally because cognitive and emotional biases could influence their decisions. Jaiyeoba and Haron (2016) suggested that investors do not follow the strictly complex mathematical theory of prediction when making financial decisions under uncertainties and investors relied on behavioural factors to make investment decisions, especially in the stock markets. Kahneman and Tversky (1979) argued that investment decisions are based on psychological underpinnings, and their argument led to the resurgence of behavioural finance in recent times to complement the modern finance theories (Ahmad et al., 2017; Jaiyeoba & Haron 2016). Behavioural finance postulates that human beings are irrational in their decision making (Ahmad et al. 2017). Ahmad et al. (2017) further argued that the irrationality nature of human beings is biological, psychological, and sociological. Other Scholars posit that behavioural biases have a significant influence on individual investors than institutional investors who depend on expert portfolio advisors in decision making (Barberis and Thaler, 2003; Fama, 1998).

Surprisingly, existing literature has not fully delved into studying behavioural finance to access its relevancy. The few extant studies on behavioural finance also have fragmented results from diverse contexts (Ahmad et al., 2017; Jaiyeoba & Haron, 2016; Prosad et al., 2015). For instance, whiles Prosad et al. (2015) argued that behavioural

biases are contingent on investor's demographics and overconfidence, Jaiyeoba and Haron (2016) stipulated that investment decisions are based on psychological preferences that are context-driven. Also, several studies in developed countries and few emerging markets found that behavioural biases influence investment decisions (Kengatharan, 2014; Qadri & Shabbir, 2014; Nofsinger & Varma, 2014; Jaiyeoba & Haron, 2016; Prosad et al. 2015). This conclusion has not been ascertained in developing countries, especially in the West African countries. This study fills these gaps in research regarding true predictive abilities of the constructs of the behavioural biases or factors that influence investor's decisions. Specifically, the study examines the effects of behavioural biases on investment decisions in a developing country, Ghana.

Our contributions are fivefold. First, the study's results would enable the practitioners to identify their mistakes and provides particularly suitable suggestions for financial experts in making stock investment decisions. This could allow financial advisors to become more prudent in understanding the psychology of their clients and enable them to improve investment portfolios. Second, investment bankers would understand the market feelings as they float shares to make a reasonable financial decision to help maximize their returns. Third, the study addresses the information deficiency to government and seekers of finance from the Stock Exchange and Securities in developing countries on the behavioural biases. This would form the foundation of formulating strategies on how to maximize Stock Exchanges potential as capital seekers. Also, the study's findings would help policymakers to appreciate the implication of future decisions, policies, and regulations. Finally, the study will contribute to, arguably, the available literature in the field of behavioural finance from the developing context perspective. The findings will complement the modern theories in investment decision making not only in the Ghana Stock Exchange (GSE) but also in the stock market in other developing countries.

The rest of the study is structure as follows. Section 2 reviews the relevant theoretical and empirical literature on behavioural finance and investment decisions. Section 3 and Section 4 presents the methods and results, respectively. Chapter 5 concludes the study and offers recommendations for further research.

2. Literature Review

2.1 Theory and Hypothesis

The theories of behavioural finance include Bounded Rationality Theory, Prospect Theory, Theory of Mind, and Activating – Beliefs – Consequences (ABC). However, this study is backed by Prospect Theory (PT). The PT is an alternative model of decision-making under risk and uncertainty (Kahneman & Tversky, 2013). PT posits that individual choices are in two phases, namely framing and evaluation. During the framing stage, the individual investor constructs a representation of the acts, contingencies, and outcomes significant to the decision. For the evaluation stage, the individual investor assesses each of the prospects available and makes a decision (Tversky and Kahneman, 2013). The following are the characteristics of the choice value according to the PT: Defined on deviation from the reference point, which indicates concave for gains and convex for losses, steeper for damages than for benefits; and having a nonlinear transformation of the probability scale (Tversky & Kahneman, 2013). PT describes several states of mind that can be expected to influence an individual's decision-making processes. According to Bashir et al. (2011), many behavioural biases influence investors' decision to buy or sell stocks. This study will focus on the following; Belief bias, Regret bias**,** Snakebite effect or bias, and Overconfidence bias. These behavioural biases are discussed as follows.

2.1.1 Belief Bias

Belief is the investor’s ideas that are faithful to him or her or the stability of an investor's state of mind and perception of particular dynamics about the environment (Chin, 2012). Self-confidence as a result of beliefs of the individual means to trust in once self (Tversky & Kahneman, 1991). An investor with confidence does not depict that predictions about investment decisions may always result in gains. Emotions have an immense impact on investment decision-making and most investors loss money as a result of behavioural factors (Chin, 2012). A positive mood can result in a better and appreciable gain on investment. Investors mostly have challenges in modifying existing ideas when they are confronted with a new set of decisions or contradictory information (Chin, 2012). Therefore, they encounter mental discomfort in having to reconcile based on their belief. The study, therefore, hypothesized that:

Ho: There is no influence of belief bias on individual investment decisions.

2.1.2 Regret Bias

Regret is the phenomenon when an individual investor regrets about the past loss of investment (Chin, 2012; Shefrin, 2002). Regret aversion may results in indecision and failure on the part of the investor to consider an investment due to the fear of the unfavourable outcome. This bias restricts investors to take necessary action due to

the regret of a previous failure (Chin, 2012; Shefrin, 2002). Regret aversion may be linked with risk aversion since people occasionally may fear not buying the right financial assets or buying the wrong assets. Investors may want to do away with emotional trauma associated with making bad decisions. For example, individuals who suffered losses on their investment might become conservative to minimize the pain associated with additional losses. Regret averse investors may strategically adopt a habit of investing in short- term bonds to mitigate the volatility of the stock market (Chin, 2012). Regret adverse investors may also monitor the price of the stocks already sold and tend to regret if the price changed upwards after the sale. According to Raheja and Dhiman (2017), people anticipate lament if they settle on an off-base decision and will consider this forecast when making choices in the future. Regret bias may primarily make investors feel and concentrate on gains on investment than losses because investors are allergic to missed opportunities. Das and Mohaptra (2017) posited that regret can help people to analyze the situation. Shefrin (2010) asserted that regret bias is an "emotion of pain and anger" which occurs when investors realized that they are involved in a bad investment. Again, Shefrin (2010) concluded that investors have regret when they buy stock and sell it at a price below the purchased price. Hence the study hypothesized that:

Ho: Regret bias does not affect the individual investment decision.

2.1.3 "Snakebite" Effect or Bias

The snakebite effect is the unwillingness of an investor to undertake an investment after making a loss (Chin, 2012; Ghelichi et al., 2016). The behaviour pattern to this effect is different if the repeat behaviour is linked to the reinvestment of earlier stock that resulted in gains (Ghelichi et al., 2016). The “Snakebite” effect is a danger that threatens investors in decision making and is considered as a dominant theory to explain the behaviour of investment decision making in a condition of uncertainty (Kahneman & Tversky, 2013; Ghelichi et al., 2016). The “snakebite” effect is opposite to the influence of overconfidence. The “snakebite” effect makes investors less confident in making investment decisions (Chin, 2012). The impact of not taking an investment due to an earlier loss may result in the possibility of potential gains from buying the investment at a relatively low price.

According to Barber and Odean (2013), after investors experience a loss on investment, they become unwilling to take risks on their next venture. A study conducted by Das and Mohapatra (2017) strongly evidenced that the “snakebite” effect influence investors in making decisions that may result in errors in their judgement. Another study reviewed that “snakebite” causes the fear to take risks that prevent investors from profit lock which affects investment’s returns (Kartasova et al., 2014). Hence the study hypothesized:

Ho: "Snakebite" effect does not affect the individual investment decision.

2.1.4 Overconfidence Bias

Overconfidence bias is an excessive belief in investor’s judgements and abilities based on experience and information available to him. Based on the information they are preview to, investors tend to believe that they know more. They found on knowledge and skills and disregarded the risk associated with the investment (Raharja et al., 2017). Overconfidence bias has a significant favourable influence on investment decisions (Subash, 2012). It shows that investors associate higher returns on investment due to previous knowledge and capacity, and blame lower returns on lousy luck (Qadri & Shabbir, 2014). Overconfidence makes investors too confident about their investment decision. Odean (1999) asserted that overconfidence overestimates the accuracy of knowledge about the value of security. According to Agrawal (2012), overconfidence is among the most essential and useful behavioural biases that have many hostile consequences for investors such as lower expected utility, a higher tendency of leaving the market, excessive transactions, and lower returns on investment. It is evidenced in the literature that overconfidence causes investors to have economic returns on their investment. Additionally, Subrahmanyam (2008) confirm that, in general, overconfidence is harmful to individual investors. For instance, Eichholtz and Yonder (2011) found out that overconfidence in investment decisions negatively affect firm’s performance. Odean (1999) also added that individual investors with discount brokerage accounts become overconfident and engage in extra trading that leads to their inability to cover their transaction expenses. Overconfidence always causes investors to underestimate risk and overestimate their knowledge based on the fact that they have more information. Hence the study hypothesized that:

Ho: Overconfidence bias does not influence an individual's investment decision.

2.2 Empirical Review

Lim's (2012) found that overconfidence, conservatism, and regret have a significant favourable influence on investment decisions, but herding behaviour was found not to influence investors' decisions. Kengatharan and Kengatharan (2014) in a similar study found out herding bias, prospect, availability, and market factors have a moderate influence on investment decisions except for anchoring bias that has a high impact on investment

decisions. According to Ngoc (2014), overconfidence, loss aversion, market factor, and regret have a moderate influence on investment decisions, however, market factors exhibit a more substantial impact on a resolution in investment.

Kafayat (2014) found out that overconfidence, over-optimism, and self-attribution influence decision are negatively correlated with investment decisions. Ramiah et al (2016) found out that overconfidence bias influences investment decisions. Qadri and Shabbir (2014), in their study, found out that overconfidence bias and "illusion of control" have a significant favourable influence on investment decisions. The following biases such as overconfidence, anchoring, regret bias, and loss aversion, influence investment decision making, according to Tripathy (2014).

Wamae (2013), in a study conducted in Kenyan, found out that behavioural factors such as herding bias, prospecting, risk aversion, and anchoring bias influence investment decisions. The study also found out that herding bias is the most significant influence follow by prospecting, anchoring bias, and risk aversion. In a survey conducted by Bashir et al. (2013), the result shows that the overconfidence bias, confirmation bias, the illusion of control, excessive optimism also have a positive and significant influence on investment decisions. Also, preferences such as loss aversion, mental accounting, and status quo, however, exhibited no influence on investment decisions. Other research conducted found out that the "recency effect" has an impact on share repurchasing behaviour (Nofsinger & Varma, 2014). Babajide and Adetiloye (2012) found out that biases such as overconfidence bias, loss aversion, framing, and status quo have influence investment decisions but weak negative correlation on stock market performance.

According to Qureshi et al. (2012), representative bias, gamblers fallacy, anchoring, overconfidence bias, availability bias, and risk aversion have a significant favourable influence on decision making in Pakistan. The study conducted by Mbaluka et al. (2012) found out that framing and regret influence investment decisions. Luong et al. (2011) found out that overconfidence bias, market factor, availability bias, anchoring, and prospecting have a moderate influence on investment decisions with market factors having the highest effect. The study also found out that three preferences (herding, prospect, and overconfidence) have an impact on investment performance.

3. Methods

3.1 Design and Data

We employ a descriptive survey design to collect data using quantitative analysis. Data were gathered from the primary source through the use of a questionnaire because previous studies used primary data to answer the research questions (Bakar & Yi, 2016; Chin, 2012; Prosad et al., 2015; Subash, 2012). The use of surveys is convenient and avoids researcher bias (Bell & Bryman, 2007; Gyimah & Boachie, 2018; Gyimah et al., 2019, 2020). The questionnaire used for the study is adapted and modified from Chin (2012) and Prosad et al. (2015). Data for this research work is collected from the appropriate sector of the population, including professionals and nonprofessionals who have an investment in stocks in the West Africa region, Ghana. Since there is no official list of individual investors in Ghana, the study uses a purposive sampling technique to select a sample of 150 respondents (Sarpong-Danquah et al., 2018). Kent (2007) argues that a sample size of 100 respondents and above is acceptable in quantitative studies. However, out of the 150 samples, only 120 responses were complete representing a valid response rate of 80%.

3.2 Analysis and Model

Descriptive statistics including frequency tables, percentages, measures of central tendency, and dispersion (mean and standard deviations) are used to analyze the data. The test statistic for the hypothesis testing is the Pearson correlation coefficient (r) that measures the nature and strength of the relationship between variables. Multiple linear regression is also run to show the relationship between the independent variables and a dependent variable. The econometric model for the study is presented below.

$$Decision\ making = \alpha + \beta_1 Belief\ bias + \beta_2 Regret\ bias + \beta_3 \text{“}Snakebite\text{”}\ effect + \beta_4 Overconfidence\ bias + \varepsilon$$

Where,

Decision making is measured in terms of the degree of risk the investor is willing to take. The study adopts the decision-making variable “I take the safe option if there is one” by Chin (2012) using a 5-point Likert scale from 1-strongly disagree to 5-strongly agree.

Belief bias variable “I trust the research and past performance of the firm” is adapted from Chin (2012) and Prosad et al. (2015) using a 5-point Likert scale from 1-strongly disagree to 5-strongly agree.

Regret bias variable "I should hold the stock longer because now the price has increased over the selling price" is adapted from Chin (2012) and Prosad et al. (2015) using a 5-point Likert scale from 1-strongly disagree to 5-strongly agree.

"Snakebite" effect variable "I worry about the influence of financial crises" is adapted from Chin (2012) using a 5-point Likert scale from 1-strongly disagree to 5-strongly agree.

Overconfidence bias variable "I can predict the future stock price movement after I did some analysis" is adapted from Chin (2012), Prosad et al. (2015) and Subash (2012) using a 5-point Likert scale from 1-strongly disagree to 5-strongly agree.

α is the constant

$\beta 1$, $\beta 2$, $\beta 3$, and $\beta 4$ are the predictors or coefficient of determination.

ε - Is the random variable or stochastic term or the error term.

3.3 Reliability Test

Cronbach's Alpha is used to test the reliability of the study's variable. Put differently, Chronbach's Alpha affirms the reliability test for the constructs used to examine the influence of Behavioral bias on investment decisions. We record Cronbach's Alpha of 0.651, 0.626, 0.645, and 0.651 for belief bias, regret bias, snakebite effect, and overconfidence bias, respectively. All the scales in the instrument shows good reliability because they meet the threshold suggested by Nunally and Bernstein (1994) that argue that Cronbach's Alpha greater than 0.6 is acceptable.

Table 1. Demographics Statistics (N = 120)

	Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Gender				
Male	71	59.2	59.2	59.2
Female	49	40.8	40.8	100.0
Age				
18 - 24 years	2	1.7	1.7	1.7
25 - 30 years	11	9.2	9.2	10.8
31 - 40 years	48	40.0	40.0	50.8
41- 50 years	44	36.7	36.7	87.5
Above 50 years	15	12.5	12.5	100.0
Education				
Diploma	7	5.8	5.8	5.8
Undergraduate	44	36.7	36.7	42.5
Postgraduate	59	49.2	49.2	91.7
PhD	10	8.3	8.3	100.0
Profession				
Public Sector (excluding bank)	49	40.8	40.8	40.8
Private Sector	3	2.5	2.5	43.3
Bank (including private and public)	25	20.8	20.8	64.2
Financial Expert	38	31.7	31.7	95.8
Self-Employed	5	4.2	4.2	100.0
Income				
Between Ghc501 - Ghc1000	3	2.5	2.5	2.5
Between Ghc1001 - Ghc2000	61	50.8	50.8	53.3
Above Ghc2000	56	46.7	46.7	100.0

4. Results

4.1 Demographic Statistics

Table 1 presents the statistics for the demographics variables. In terms of gender, 71 of 120 respondents representing 59.2% are males while 49 representing 40.80% are females. The implication is that males have a higher chance to buy and sell shares than females because males take risky investments than females. For the age groups of the sample, 48 representing 40.0% belong to the age group 31-40 years. The age range of 41- 50 years obtains a frequency of 44 representing 36.7% whereas 11 respondents representing 9.2% belonging to the age group 25-30 years. Meanwhile, about 15 respondents representing 12.5% belong to those above 50 years, two respondents indicating 1.7% are between the age of 18-24 years old. The results show that investors in the

age group of 31-40 years old are most active in stock investment.

On the part of the educational qualification of individual investors, most of the respondents (59) representing 49.2% have a postgraduate certificate, followed by 44 respondents representing 36.7% that have an undergraduate certificate. Meanwhile, 10 respondents indicating 8.3% are Ph.D. certificate holders, and 7 respondents representing 5.8% are diploma certificate holders. The results show that most of the investors, about 94.2% are highly educated (undergraduate, postgraduate, and Ph.D.), and this enhances their skills and knowledge in investing in stocks.

For the profession of investors, 49 respondents representing 40.8% are in the public sector (excluding banks) followed by financial experts with 38 respondents representing 31.7%. The rest of the respondents are 25 (20.8%), 5 (4.2%), 3 (2.5%) represent employees of banks (including private and public sector), self-employed, and private sector, respectively. This shows that public sector employees are the most investors that invest in stock in Ghana (Sakyiwaa et al., 2020).

Finally, most of the respondents, 61 representing 50.8%, are within the income range of GHC 1001-2000. They are followed by those above GHC 2000 with 56 respondents representing 46.7% and three respondents constituting 2.5% belonging to the income range between GHC 5001-1000. These results show that those with income range from GHC 1000-2000 are interested in investment to maximize their wealth.

Table 2. Knowledge about Investment (N = 120)

Constructs	*Frequency*	*Percent*	*Valid Percent*	*Cumulative Percent*
How many years you have been investing				
Between 1 - 5 years	79	65.8	65.8	65.8
Between 6 - 10 years	41	34.2	34.2	100.0
How often have you invested in the stock				
Below 5 times	58	48.3	48.3	48.3
Between 5 - 10 times	45	37.5	37.5	85.8
Over 10 times	17	14.2	14.2	100.0
Before making investment				
Mostly about potential gains	70	58.3	58.3	58.3
A little about potential loss	13	10.8	10.8	69.2
Security of investment	37	30.8	30.8	100.0
The decline in value of stock				
Ignore	59	49.2	49.2	49.2
Buy	1	.8	.8	50.0
Avoid	57	47.5	47.5	97.5
Discuss	3	2.5	2.5	100.0
Price of investment jumps				
More	5	4.2	4.2	4.2
Lock-in	52	43.3	43.3	47.5
Stay-put	63	52.5	52.5	100.0

4.2 Knowledge about Investment in Stocks

Table 2 presents the statistics results on how knowledgeable the respondents are in terms of stock investment. Firstly, we asked the respondents how many years they have invested in stocks. The result shows that most of the respondents, 78 representing 65.0% have been trading stocks between 1- 5 years. This is followed by 41 respondents representing 34.2% that have been trading in commodities between 6-10 years, and only 1 respondent representing 0.8% have been trading in stocks above 10 years. The result shows that most of the investors understand the stock trade and this accounted for 1-5 years in business. They concentrate on other investment portfolios than investment in stocks.

Secondly, we also asked the respondents how often have they have invested in stocks that seem safer to invest. The result in Table 2 shows that 58 of the respondents representing 48.3% have been trading in commodities below 5 times, and 45 respondents representing 37.5% have been trading in stocks between 5-10 times. Lastly, 17 respondents representing 14.2% have been trading in stocks above 10 times. The result shows that investors have stocks, but most of them do not buy their stock because most of them do not know about how to trade their stocks through stockbrokers due to the least number of times of trade below 5 times. We also asked the respondents what they think before investing. Most of the respondents (70 representing 58.3%) report that they are concern about potential gains. The second most crucial issue is the security of the venture, and about 37 respondents representing

30.8% are in this category, 13 respondents indicating 10.8% think about little loss. This result shows that investment in stocks is male-dominated and that they are concern about potential gain than others that accounted for the highest response of 58%.

Moreover, when respondents were asked how they will respond when the value of their stock decline 20%, Most of the respondents 70 representing 58.3% responded to the question, "I would remain invested and ignore temporary changes as I look for long growth". The result indicated most of the respondents are interested in the long-term growth of their investment. The next group of respondents 57, representing 47.5% responded to the question, "I would sell to avoid further worries and try something else". Lastly, when the respondents were asked how they will respond when the value of their stock jumps by 25%, most of the respondents 63 representing 52.5% responded to the question "I will stay put and hope for more gain". This shows that the respondents are interested in future gains. The next group of respondents 52, representing 43.3% responded to the question "I would sell it and lock in my gains. The remaining of the respondent obtain 5, representing 4.2% responded to the question "I would buy more as the price could go higher".

4.3 Descriptive and Inferential Analysis

4.3.1 Descriptive Statistics

Table 3 provides the detailed test results used to analyze and abridge the questions designed that are based on dependent and independent variables. For the belief bias, the variable "I trust the research and past performance of the firm" obtains the most important mean of 4.62 with a standard deviation of 0.568. This result shows that individual investors solve problems through pure judgments. As suggested by Tversky and Kahneman (1991), these judgments heuristics help but leads to errors. Chin (2012) posits that investors also spot trends in stock prices, and they expect that the past amount should continue based on their identified pattern.

In terms of regret bias, the item "I should hold the stock longer because now the price has increased over the selling price" recorded a higher mean of 4.78 and a standard deviation of 0.418. The study is evidenced by Shefrin (2002) and Chin (2012). From Table 3, the item "I worry about the influence of financial crises" in the snakebite effect variable recorded the highest mean of 4.86 with a standard deviation of 0.350. The analysis indicates most of the respondents fear the financial crisis because they lose a lot of money in stocks as a result of that. The findings confirm the common "adage once biting twice shy". This evidence of the "snakebite effect" is consistent with the works of Chin (2012) and Keller and Pastusiak (2016).

Furthermore, the result in Table 3 shows that most of the respondents are overconfident when it comes to their prediction. The statement in overconfidence bias "I can predict the future stock price movement after I did some analysis" recorded a higher mean of 4.83 with a standard deviation of 0.440. This findings is consistent with Chin (2012) and Muradoglu and Harvey (2012) and also on a study conducted by Barberis and Thalar (2003) on the topic "self-attribution bias".

Lastly, the decision-making variable (dependent variable) "I take the safe option if there is one" recorded a higher mean of 4.82, a standard deviation of 0.382. The implication is that most respondents are risk-averse and would select safer options in their decision making. The findings are consistent with Oslen (1998).

4.3.2 Pearson Correlation Test

From Table 3, the correlation result indicates that there is a significant positive and robust relationship between belief bias and investment decision, $r = 0.952$, $n = 120$, and at 0.01 significance level. The implication is that investors believe in the information or news they obtain from other sources. These investors persist in their beliefs based on "hot" tips from some forum and may lead to an overreaction that may result in wrong decision making. The result also indicates that there is a strong significant and positive relationship among regret bias and investment decision, $r = 0.964$, $n = 120$ at 0.01 significance level. Naturally, it is rational and reasonable that every person will experience regret sometime in life. This finding is evidenced by Shefrin (2009) that finds similar results indicating that investors have regret when they buy stocks and sell them at a price below the purchased amount.

Also, the "snakebite" effect has a positive significant relationship between investment decision ($r = 0.946$, $n = 120$, $p = 0.000$). The implication is that investors are prone to fear after a huge loss in the stock market due to financial crises. Investors feel pessimistic and do not have the zeal to buy "winning" stocks. These investors do not want to take a higher risk, and they sell their stocks quickly when they suspect lower prices to avoid further losses. Lastly, the correlation result of $r = 0.867$, p-value = 0.000, and $n = 120$, indicates that there is significant, positive relationships between overconfidence bias and investment decision. The result also implies that some respondents lack confidence and are pessimistic that their stock prices may fall.

Table 3. Descriptive and Correlations

Variables	*Mean*	*Standard Deviation*	*1*	*2*	*3*	*4*	*5*
1. Decision making	4.82	0.382	1.000				
2. Belief bias	4.62	0.568	0.952**	1.000			
3. Regret bias	4.78	0.418	0.964**	0.421*	1.000		
4. "Snakebite" effect	4.86	0.350	0.946**	0.403*	0.440*	1.000	
5. Overconfidence bias	4.83	0.440	0.946**	0.436**	0.423*	0.411*	1.000

Significance level: * p-value < 0.05

** p-value < 0.01

Table 4. Regression Test Results

Model Parameter Estimates *Variables Name*		Model β	Standard Error	t-Statistics	Model Sig.
_Constant		0.083	0.013	6.330	0.000
Belief bias		0.276	0.009	32.391	0.000
Regret bias		0.264	0.011	24.477	0.000
"Snakebite" effect		0.339	0.012	28.426	0.000
Overconfidence		0.090	0.010	8.872	0.000
Model Test Results					
N	120				
R Square	0.998				
Adjusted R Square	0.997				
Model Significance	0.000				

4.4 Regression Results

Table 4 presents the regression results used to examines the bahavioural finance – investment decisions nexus. From the regression analysis in Table 4, the four independent variables explained 99.7 % of the investment decision shown by the adjusted R-squared. The implication is that the four bias contribute 99.7% to decision in investing in stocks, other variables which are not considered in this study accounted for 0.3% of investment decision. Put differently, 99.7% variation in investment decisions of individual investors is explained by behavioural biases. Also, the t-statistic values are greater than 2 with a significant p-value of less than 1%. Thus, the study rejected all the null hypotheses and concluded that all four biases influence investor's decisions**.**

Holding other factors constant, a unit increase in belief bias resulted in a 0.276 success in the decision in investment. A unit increase in regret bias resulted in a 0.264 outcome in the investment decision. A unit increase in the "snakebite" effect resulted in a 0.339 increase in investment decision making. For overconfidence bias, a unit increase resulted in a 0.090 increase in investment decision making. The result implies that the "snakebite" effect has a high effect on investment decisions, followed by belief bias, regret bias, and overconfidence.

The study again shows that the belief bias has a positive effect on investment decision making. The result is consistent with the study of Coutts (2019), Chin (2012), and Waweru et al. (2008). The study also records a positive significant relationship between regret bias and investment decisions. This confirms the findings of Chin (2012) and Waweru et al. (2008) that recorded similar outcomes. This reaffirms that investors refuse to undertake an investment because of the fear that they may lose it. The study also confirms that investment decision making is strongly influenced by the "Snakebite effect", and agrees with Chin (2012) and Kartasova et al. (2014) study's findings. With overconfidence bias, investors attribute success to talent and expertise, while blaming 'bad luck' for failure. From Table 4, investment decision making is also positively influenced by overconfidence bias. These results are consistent with the studies conducted by Qadri and Shabbir (2014), Lim (2012), Qureshi et al. (2012), Shah et al. (2019), and Bashir et al. (2013) that report that overconfidence has a significant positive impact on investor's decision making. Meanwhile, the findings are inconsistent with Kafayat (2014), and Kengatharan and Kengatharan (2014) that found that overconfidence does not influence decision making.

5. Concluding Remarks

This study examines the influence of behavioural biases on individual investment decisions in a developing country context. The research established that the presence of behavioural biases plays a vital role in influencing stock investment decisions. The study finds the four preferences or biases (overconfidence, regret, belief, and "snakebite") have a significant positive and robust relationship with investment decision making in varying

degrees. The descriptive statistics conclude that individual investors in the West Africa region (Ghana) are young, highly educated, and well experienced in making an investment decision. The study records a significant positive relationship between belief bias and the investor's decision making and implies that investors depend on belief in making decisions such as "hot" tips. Further, people buy stocks because they believe in the recommendations given by others they barely know and opinions from newspapers. Besides, investors follow the crowd to buy or sell the available stock.

Moreover, the study records a significant positive relationship between regret bias and the investor's decision making. In real-life situations, every person experiences regret. Investors must recall to mind events and actions that caused regret to avoid repeating similar mistakes. As they make better decisions, they will not regret it because it is often said that "experience is the best teacher". The study again reports a significant positive relationship between the "snakebite" effect and investor's decision making. When you have a snake bite, and you see the earthworm, you are even more careful and afraid. For this reason, some of the investors who had the experience of bad investment and recorded losses are more reluctant to take a risk to buy shares even though it is appropriate to buy at that particular time. The implication is that they may miss the better opportunity of making higher returns on their investment. Lastly, the result of the study also indicates a significant positive and robust association between overconfidence bias and decision making in investment. The implication is that most of the respondents have self-confidence in their skills, knowledge in their predictions, and they are optimistic when making decisions. The findings of the study are consistent with the literature.

The study's finding is useful to individual investors in identifying their own behavioural biases to understand the dynamics involved in stock trading to enable them to make sound investment decisions—information asymmetry as one of the contributors to investor's indifference. As a result of using heuristics in investment decision making, investment information about stocks should be made available by the Ghana Stock Exchange in a form that would be understood by individual investors to help them make sound investment decisions. Investors are also supposed to be open-minded while making investment and desist from holding on to the previous happenings instead must realize that investment in stocks is dynamic. Individual or retail investors should consider many other variables in their environment rather than focusing on just one in making decisions. Investors should learn how to interpret the market and other economic indicators of the various firms in the stock market because they also affect the performance of their stock.

The study has some limitations that need to be addressed in future studies. There are many behavioural biases documented in the literature, but this study is limited to only four of the preferences. The study recommends that future research should consider the influence of other behavioural biases that are not captured. Also, future studies should view a larger sample across developing countries to confirm the study's findings. Future studies should also consider other economic factors that may affect the decision making of investors apart from behavioural biases. The final word on behavioural finance and investment decisions is not yet said, and more research is welcomed.

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Notes

Note 1. We did not show the Table for the Chronbach's Alpha results for each of the variables used for the study, and is available upon request.

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Flexibility in Learning and Teaching Styles in an Accounting Course. "Deming Towards Kolb"

Ida Verna[1]

[1] Department of Management and Business Administration, "G. d'Annunzio" University of Chieti-Pescara, V.le Pindaro, n. 42, 65127-Pescara, Italy

Correspondence: Ida Verna, Department of Management and Business Administration, "G. d'Annunzio" University of Chieti-Pescara, V.le Pindaro, n. 42, 65127-Pescara, Italy.

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"A well-made head is better than a well-filled head" Michel De Montaigne

Abstract

This work aims to investigate the effect of a holistic approach to teaching on both the educator's learning and teaching styles and on student performance. To this end, an experimental holistic approach was adopted, L'Ascolto®, which uses the Deming PDCA cycle for the design (Plan), management (Do), evaluation (Check) and improvement (Act) of teaching processes. The aim is to encourage educators to "train" their flexibility in learning by following the Kolb Experiential Learning Cycle. The paper is presented as an original study aimed at empirically examining the effects of an experimental holistic approach (L'Ascolto®) on the educator's experiential learning process in a university accounting course. On one hand, the results show positive student performance, while, on the other, the positive effects of the educator's experiential learning emerge, as evidenced by the different teaching styles adopted during the course (flexibility).

Keywords: accounting education, deming cycle, experiential learning, higher education, Kolb, QFD, teaching methods

1. Introduction

The paper offers a reflection on the possibility of dealing with the complexity of teaching through a holistic approach that supports the educator's experiential learning development in his/her context. Holistic education means "[...] developing the whole person [...] education is not only cognitive knowledge of the facts, but also includes the development of social and emotional maturity" (Kolb, Kolb, Passeralli & Shama, 2014). Thus, "learning flexibility indicates the development of a more holistic and sophisticated learning process" (Kolb et al., 2014). The educators' teaching style is influenced by the way they learn. Jung's theory holds that adult development passes from a specialized manner of adaptation toward a holistic integrated stage, thus the development of learning flexibility is seen as a transition from specialization to integration.

Adopting a flexible teaching style presumes that educators are aware of their learning styles and the need for flexibility in these styles. To develop learning flexibility in students, i.e. a more holistic, structured learning, the author proposes a holistic approach to the complexity of teaching (L'Ascolto®, note 1). This approach will orient educators towards the Kolb Learning Cycle, thus envisaging a continuum of teaching processes in their relationship with students and their reference context. This can be considered as a sort of "training in flexibility".

There are many studies in the literature on student experiential learning in accounting (Butler, Church & Spencer, 2019; Gitting, Taplin & Kerr, 2020) although little attention has been given to the problem of the complexity of teaching. Less attention is paid to the educator's experiential learning using holistic approaches that consider this complexity.

Hence, the decision was made to observe and guide the experiential learning process of the educator of an accounting course attended by 215 second-year students of an Economics and Management degree course, using the experimental holistic approach, L'Ascolto. This approach applies the Deming cycle to design (Plan), management (Do), evaluation/self-evaluation (Check) and improvement/standardization of teaching processes (Act) encouraging the educator to go through the stages of the Kolb Learning Cycle (Concrete Experience – CE, Reflective Observation – RO, Abstract Conceptualization – AC, Active Experimentation - AE). The educator's

continued reiteration of the PDCA cycle enables Experiencing (Do), reflecting (Check), thinking (Act) and acting (Plan/Do), to understand of his/her experiences (Do/Act) and allows the educator to transform them (Check/Plan) by adapting his/her own behaviour (learning flexibility).

Educators do not always receive adequate training to enable them to recognise their learning and teaching styles thereby hampering their development of flexibility when both learning and teaching.

The work aims firstly to verify if the holistic approach of L'Ascolto can help educators to progress through the Kolb Learning Cycle while respecting the complexity of teaching, namely in a continuum of learning processes involving both their relationship with students and their reference context. In addition, it aims to check whether this "training" in flexibility also produces flexibility in the educator's teaching styles and, finally, whether this has a positive impact on student performance. However, it should be noted that the work does not focus on demonstrating evidence of student performance (although this is presented at the end of the work) but is stimulated by the desire to identify "a process approach" that guide the educator through the Kolb experiential learning process in his/her specific context. (of time, place and relationships).

Although measuring results is an important aspect "the problem in education is that instead of following theory, measurement often precedes it, with the result that we often find ourselves measuring something without knowing what it is" (Sternberg, 1997, p.108). Kolb et al. (2014) observe that "Yet the treatments in education are not uniform pills, but instruction carried out by unique educators in relationship with equally unique students, influenced by a wide variety of contexts" (p.211).

The work is divided into three parts. The analysis of the literature anticipates the presentation of the L'Ascolto experimental holistic approach related to the Kolb Learning Cycle. There then follows an analysis of the experimentation phases of the "Deming/Kolb" approach in an accounting course and the results achieved.

2. Literature Review

2.1 Complexity, Holistic Approach and Experiential Learning

2.1.1 Complexity

It is noted that holistic education requires an analysis of complexity, of the general/entirety and not only of the individual parts. Concerning the concept of complexity, Morin (2001) observes how *complexus* refers to elements woven together: there is complexity when the different elements that make up the whole are inseparable. Ultimately, there is a close interdependence between the object of knowledge and its context, between the parts and the whole (and vice versa) and between the parts themselves (p.38). In his writings on the university, Newman (1999) also links them back to a single whole. Complexity is the link between unity and multiplicity. In today's world we are forced to face the challenges of complexity, "consequently education must promote 'general intelligence' capable of referring to what is complex, to the context in a multidimensional way and to the global" (Morin, 2001, p. 38).

Higher education must necessarily address complexity, as teaching is by its nature complex and this can be neither ignored nor avoided. The concept of didactic complexity (Casey, Gentile, & Bigger, 1997) is linked to aspects concerning the time in which learning takes place (dynamic aspect) (Olwia, 1996; Marsh & Roche, 1997), the variables involved and the links between them (systemic aspect) and the social, disciplinary and cultural context of reference (Lawn, 1991; Carpenter & Tait, 2001). If, therefore, the objective is to improve student performance, this can only occur through the development of the educator's professional skills within his/her context (systemic aspect) and on an ongoing basis as regards the provision of learning processes (dynamic aspect) and regarding the individual's context (discipline, university, culture, etc.). It is, therefore, necessary to tackle the complex nature of teaching with a holistic approach that takes all these aspects into consideration. The literature on student performance assessment in accounting courses is highly developed, yet little attention is paid to the evaluation of students' performance related to an assessment of the educator's performance (systemic aspect) throughout the delivery of the course (dynamic aspect) and related to the needs of the context (discipline, University, stakeholders, etc.). Hence, it is necessary to reflect on the possibility of evaluating student performance through holistic approaches (Verna, Ianni, D'Andreamatteo, & Venditti, in press).

2.1.2 Holistic Approach

L'Ascolto is a holistic approach aimed at the continuous improvement of all university teaching and education processes by listening to, and satisfying, the needs of all those involved in education, teaching and training in a systemic, dynamic and contextual way (Verna, 2017; Verna, Antonucci, Sargiacomo, & Venditti, 2019).

It can be noted that in accounting there is a lack of studies that address the issue of improving student

performance through holistic approaches. That is, approaches that consider listening and the satisfaction of educational actors (students, teachers, institutional bodies, social partners) in a systemic, dynamic and contextual way.

In the literature, there is a recognized need for a holistic approach to higher education (Sakthivel & Raju, 2006) and numerous studies address these issues (Horine & Hailey, 1995; Burkhalter, 1996; Barnard, 1999). However, the need to address the wider management context of the institutions has emerged that goes beyond a "partial holistic" (Mantos, Sarrico, & Rosa, 2017).

When we accept complexity, we aim to achieve the overall cognitive development of both the educator and the students in the teaching processes underway and in the context in which the teaching takes place. Therefore, if it is desirable to educate the student holistically, it is essential that this (social and emotional) maturity is present in the educator and that it constantly evolves.

It has already been noted how "Learning flexibility indicates the development of a more holistic and sophisticated learning process (Kolb et al., 2014). Sternberg points out that "[...] the advantages of flexibility are so overwhelming that one wonders why we do not emphasize it more in teaching our children, students, and employees" (p.105). An attempt was made to combine the quest for flexibility in the educator's learning styles with a holistic approach to university teaching to tackle the complexity of teaching.

2.1.3 Experiential Learning

In recent years, there has been great development in student-centred experiential education (Bielefeldt, Dewoolkar, Caves, Berdanier & Paterson, 2011). Kolb's Experiential Learning Theory (ELT), has been disseminated widely by experiential educators in numerous fields and academic disciplines (Kolb & Kolb, 2013). There are numerous studies on student-centred learning environments in accounting too (Canboy, Montalvo, Buganza & Emmerling, 2016; O'Connell, Carnegie, Carter, de Lange, Hanchock, Helliar & Watty, 2015). In the realm of Experiential Learning Theory – ELT, these studies highlight, for example, the benefits of good Experiential Learning Activities - ELA (Butler, Church & Spencer, 2019; Gitting, Taplin & Kerr, 2020). However, it has been observed that the pedagogical benefits deriving from the implementation of experiential education in accounting courses are accompanied by challenges that need to be addressed (Butler, et al., 2019, p.16). Specifically, "instructors implementing an experiential learning model must adequately prepare for an uncontrolled environment to effectively manage the experience and to mitigate low student satisfaction. […] research, training, planning, and communication by instructors can alleviate the potential risks of these challenges of implementing experiential education" (Butler, et al., 2019, p.17).

Ultimately, the educator's training cannot be taken for granted or detached from that of the student. This once again brings us back to the issue of complexity, or the systemic aspect of the relationship between the parties (educators, students) and the dynamic aspect linked to the time in which this relationship takes place. Thus, the paper attempts to contribute to the literature by focusing on the educator's experiential development guided by a holistic approach (for the observation and understanding of complexity). The aim is to develop flexibility in students' learning styles through the development of flexibility in the educator's learning and teaching styles. The work is therefore based on Kolb's experiential learning (1984) and on the theoretical support that precedes it.

In particular, Kolb's experiential learning concept, which derives from Vygotsky's concept of the Proximal Development Zone, is based on the assumption that learning is the result of an interaction between what we experience in a specific context and the knowledge present in an individual at a given moment. Kolb shared and collected the prominent works of important twentieth-century scholars such as John Dewey, Kurt Lewin, Jean Piaget, Vygotsky, William James, Carl Jung, Paulo Freire, Carl Rogers and Follett who developed a dynamic and holistic model of the process of learning from experience and a multilinear model of adult development (Kolb et al., 2014). As noted by the author, individuals build their knowledge within their environment, and experiences can be transformed into learning. Thus, learning is the result of a reflection on action. Knowledge is the result of either the observation of concrete experiences or the understanding of abstract conceptualizations, transformed by reflective observation and expanded by experiment. Kolb's experiential learning cycle is, therefore, developed as a dynamic vision of learning "driven by the resolution of the dual dialectics of action/reflection and experience/abstraction" (Kolb et al., 2014, p.213). Quoting James, Kolb highlights how everything starts and ends in the continuous flow of experience (James, 1912, p.4). The continuous exposure to experience in an endless cycle allows gradual, continuous improvements in the logic of experiential learning. Kolb et al. (2014) define learning as "…the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (Kolb, 1984, p.41). The scholar underlines how "grasping experience refers to the process of taking in information, and transforming

experience is how individuals interpret and act on that information".

Specifically, the two scholars (Kolb et al., 2014) highlight how learning must be considered in terms of process (and not result): a holistic process of adaptation to the world that arises from the synergy between people and their environment, a process of knowledge creation.

Therefore, to develop holistic education we require an approach to teaching that respects its complexity (systemic, dynamic and contextual) while recognising that it is a process that creates knowledge through the observation and transformation of experience. To this end, L'Ascolto applies the Deming cycle (PDCA) to the teaching processes, directing the educator's experiences towards continuous cycles of lesson design for the course (Plan), management of teaching processes (Do), evaluation/self-evaluation of learning outcomes (LO) (Check) and improvement of training processes (Act). The educator then learns dynamically through concrete experiences (Do), transformed by reflective observation (Check) and expanded by abstract conceptualization (Act) and active experimentation (Plan). In this sense, in a structured and systematic way, L'Ascolto fuels a system that creates, manages and shares the knowledge deriving from these processes. The educator, therefore, learns through continuous exposure to experience in an endless cycle (Deming/Kolb) that allows gradual but continuous improvements within the logic of experiential learning. By encouraging the educator's experiential learning in the different phases of design, management, evaluation and improvement, L'Ascolto enables the educator to pass through the stages of experience, reflection, abstract conceptualization and active experimentation, in order to improve gradually but continuously. As already noted, the aim of this work is to verify whether it is possible to induce "flexibility training" in the educator's learning styles and then to verify if this reflects on teaching styles (flexibility) and student performance. To this end, the following paragraph presents a reflection on the evidence in the literature regarding flexibility. We then further analyse the Kolb Learning Cycle and its possible application to the L'Ascolto holistic approach.

2.2 Flexibility in Teaching and Learning Styles

Learning style can be defined as "[…] a description of the attitudes and behaviour which determine an individual's preferred way of learning" (Honey & Mumford, 1992, p.1). Hayes and Allison (1996) note how "learning style is a potent individual characteristic that may have important consequences for the efficiency and effectiveness of training and development" (p.71).When discussing learning styles, "Scott, citing Dweck (2008), argues that this is an entity approach to ability that promotes stereotyping and labelling rather than a process approach that emphasizes developmental potential and contextual adaptation" (Kolb et al., 2014).

The literature investigating students' learning styles is particularly vast. It has been found that specific student learning styles are associated with better performances (Riding & Douglas 1993). Hence, different approaches have been proposed with the aim of creating conditions that may improve student performance. Examples of such studies are those of Witkin (1976), Kolb (1984), Honey and Mumford (1992), Rush and Moore (1991). Numerous empirical studies evaluate the impact of alignment or misalignment of these styles on student performance (Mcdonald, 1984; Rush & Moore, 1991; Duff, 1998; Visser, McChlery, &Vreken., 2006). Students' learning styles may be compatible or incompatible with the educator's teaching styles. There are many advocates of a correspondence between teaching and learning styles (Haddon & Lytton, 1968; Felder, 1993; Ford & Chen, 2001; Visser et al., 2006). Some authors highlight how, for example, "students whose learning styles are compatible with the teaching style of a course instructor tend to retain information longer, apply it more effectively, and have more positive post-course attitudes toward the subject than do their counterparts who experience learning/teaching style mismatches" (Felder, 1993). By contrast, other scholars do not detect such evidence (Messick, 1976; Kogan, 1980; Miller, 1991), leading to ambiguous results (Zhang, 2006).

There are numerous studies in the literature that underline the advantages deriving from compatibility between the teaching styles of the educator and the student's learning (Felder, 1993) and their effects on student performance. In particular, some studies (Kolb, 1976; Honey & Mumford, 1986) propose to overcome weaknesses in students' learning styles with teaching styles that do not correspond to students' natural learning preferences, thus developing a more integrated and flexible approach to learning. Emeritus scholars including Sternberg, Kolb and McIntry have strongly emphasized how the educator's flexibility in teaching styles has extremely positive effects on the students' learning outcomes compared to teaching based on a single style.

Thus, the educator's flexibility in teaching styles can meet the different learning styles of students and work on the flexibility (Kowoser & Berman, 1996) that students need to acquire in their cognitive styles to respond to the varied requirements of the environment (Honey & Mumford, 1986). In this regard, Rush and Moore (1991) observe how by stimulating students to learn in a form that does not correspond to their preferred style may enable them to overcome weaknesses in their cognitive styles and thus improve learning. This presumes that the

educator is aware of his/her learning and teaching styles. Without this awareness, it is difficult to imagine how there might be an influence on students' learning outcomes, unless by chance. Hayes and Allinson (1996), therefore, highlight the need for further research aimed at exploring how educators may be helped to become more flexible in their teaching styles. This paper attempts to contribute to such research. Note that educators often fail to receive the necessary training to achieve knowledge and mastery of their own styles and hence cannot provide flexibility. For example, if educators were able to work on their learning style, to "train" in being flexible, this could, in turn, make their teaching styles more flexible and thus influence their students' learning styles. The following paragraph provides a brief outline of Kolb's experiential learning process to highlight if and how the L'Ascolto approach supports the development of the experiential learning of the educator in his/her context.

2.3 Kolb Experiential Learning Cycle

Kolb proposed a model of learning styles that explains the process that underlies learning, namely, a process that creates knowledge through the observation and transformation of experience (Kolb, Rubin, & McIntyre, 1971). The authors describe knowledge as a transformation of experience through a never-ending 4-stage cycle (Concrete Experience - CE, Reflective Observation -RO, Abstract Conceptualization -AC, Active Experimentation -AE). The learner can enter the cycle at any of the stages provided in the model, as each is linked to another. For example, in the Concrete Experience the person performing the action observes the effect of that action thus fuelling the next stage (Reflective Observation). The interpretation of events leads to abstract generalizable concepts (Abstract Conceptualization) to be experimented in new situations (Active Experimentation). The process is repeated with the new information that comes from Concrete Experience and so on in a continuous loop. A dynamic vision of learning is created that is guided by "[…] two dialectically related modes of grasping experience - Concrete Experience (CE) and Abstract Conceptualization (AC) - and two dialectically related modes of transforming experience - Reflective Observation (RO) and Active Experimentation (AE)" (Kolb et al., 2014, p.214). The important aspect is to go through all the stages to achieve gradual and continuous improvements towards balanced learning. Passing through these stages means understanding your experiences and changing your behaviour. Ultimately, when learning takes place, the process appears as a spiral where the person learning in different circumstances can anticipate the possible effects of an action. Effective learning is, therefore, represented by possessing skills derived from Concrete Experience, Abstract Conceptualization, Reflective Observation, Active Experimentation (Kolb & Fry, 1975). Figure 1 shows the whole cycle.

The problem is that frequently people only address one or more of these stages with the correct skills, thus not all the stages produce the same results, and some stages may not be addressed at all. Different styles are defined according to the preferred stages in the learning path: *Diverging, Assimilating. Converging* and *Accommodating*. The choice between the different learning modes depends on one's genetic makeup, specific life experiences, and the demands of the present environment; thus, a preferred choice among these four learning modes develops (Kolb et al., 2014).

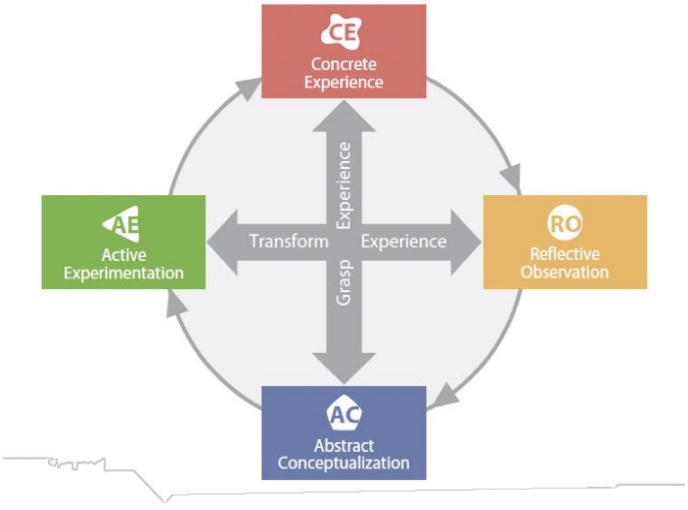

Figure 1. The Experiential Learning Cycle (Kolb & Kolb, 2013)

Two fundamental but independent aspects emerge from Kolb's theory (Duff, 1998, p.337): the experiential learning process in which the four previously described stages take place, and two orthogonal bipolar dimensions created from opposite pairings of the four stages: action/reflection and experience/abstraction (Kolb & Kolb, 2013, p.7). In the first case, individual differences are explained in terms of skills in each stage, while they are defined in terms of learning styles in the second case. "Learning style is not a fixed personality trait, but more like a habit of learning shaped by experience and choices — it can be an automatic, unconscious mode of adapting or it can be consciously modified and changed" (Kolb et al., 2014). Kolb developed a theory of experiential learning (ELT) that gave rise to the Learning Styles Inventory, LSI (Kolb et al., 1971; Kolb, 1976) and subsequent versions (Kolb, 1985; Kolb, 1999; Kolb & Kolb, 2013).

There now follows a brief description of the different learning modes that are explained in much greater detail by the above-cited authors. Learners with a *diverging* style have a preference for concrete experience and reflective observation while those with an *assimilating* style prefer abstract conceptualization and reflective observation. On the other hand, learners with a *converging* style prefer abstract conceptualization and active experimentation and finally, people with an *accommodating* style prefer concrete experience and abstract conceptualization. The learning style questionnaire was used by Kolb and Fry (1975) to highlight that there are strengths and weaknesses associated with each style and underline how important it is to overcome one's weaknesses by moving beyond any style that is too deeply rooted: "learning flexibility is the ability to use each of the four learning modes to move freely around the learning cycle and to modify one's approach to learning based on the learning situation. Experiencing, reflecting, thinking, and acting each provide valuable perspectives on the learning task in a way that deepens and enriches knowledge" (Kolb et al., 2014, p.218).

These considerations allow us to reflect on the possibility of "aiding" the educator to go through the Kolb experiential cycle by using a holistic approach to university teaching aimed specifically at developing flexibility in the learning and teaching styles of the educator within his/her context. In the following paragraph, we will examine this possibility.

2.4 Holistic Approach to Higher Education and Experiential Learning: "Deming Towards Kolb"

Considering both the complexity of teaching alongside the possibility of developing flexibility in the educator's learning styles for a more integrated, holistic learning process, this part of the paper proposes an experimental holistic approach: L'Ascolto (Verna, 2017; Verna et al., 2019). This approach aims to tackle the complexity of teaching by listening to and satisfying the needs of the actors involved in the education process, in a systemic, dynamic and contextual way. Hence, L'Ascolto applies two Total Quality methodologies (Feingembaum, 1956; Juran, 1962; Deming, 1951), that is, Quality Function Deployment, QFD (Akao, 1990) and Deming's (1951) PDCA cycle (Plan, Do, Check, Act) for the design (Plan), management (Do), evaluation/self-evaluation (Check) and improvement of teaching processes (Course of studies and single course units) considered as a single whole. This work proposes the application of L'Ascolto to a single unit of an accounting course (in a Degree Course in Economics and Management) to more clearly highlight the contribution that L'Ascolto makes to the educator's experiential development in this specific teaching/learning environment. While attention is thus focused on the learning needs of educators and students, the approach of L'Ascolto listens to and meets the needs of all the actors in education, training and learning (Verna, 2017; Verna et al., 2019). The educators' continued reiteration of the PDCA cycle, Experiencing (Do), reflecting (Check), thinking (Act) and acting (Plan/Do), enables them to understand their experiences (Do/Act) and to transform them (Check/Plan) by adapting their behaviour (learning flexibility). L'Ascolto thus offers the educator a dynamic vision of learning, guided by that double dialectic (of understanding the experience) of grasping experience (Concrete Experience - CE and Abstract Conceptualization -AC) and transforming experience (Reflective Observation - RO and Active Experimentation - AE). In particular it was observed that: "Learning arises from the resolution of creative tension among these four learning modes" (Kolb et al., 2014, p.214). Figure 2 offers an overall view of the "Deming/Kolb cycle", emphasizing the two-fold dialectic of grasping experience and transforming experience in the specific context of needs, systemic relationships and dynamic evolutions in which learning is created, through gradual and continuous improvements. It should be noted that the specific context refers to the systemic and dynamic relationship between the needs of the actors involved in the teaching process expressed synthetically as: target, needs and learning outcomes. The course targets (note 2) relate to the students' initial needs (entrance test), i.e. the gap between the students' ideal educational level (target) and the level of the students at the outset of the course (results of the entrance test). Listening to students' needs is repeated at the end of each course module (dynamic approach), thus highlighting any gap between students' learning during the course (LO) and the ideal level. The needs relate to those of the educators during the course as expressed by the gap between the ongoing learning of the students (learning outcomes) and the targets. Hence, the educator's learning needs relate to the gap between the educator's initial

level of training and that required to meet the students' needs (systemic approach). The relationship between the targets, needs and learning outcomes is, thus, the specific context of learning needs in which the steps of the PDCA cycle, briefly reported below, take place. It should be noted that the educator does not acquire generic knowledge devoid of context, but knowledge linked specifically to the context of place, time and relationship in which he/she acts. In this regard, Lave and Wenger (1991) affirm that learning must not be stripped of its context, but set in the environment and in the person's life path (Kolb, 2014).

The stages of the experiential learning cycle that the educator is encouraged to follow are illustrated for each stage of PDCA.

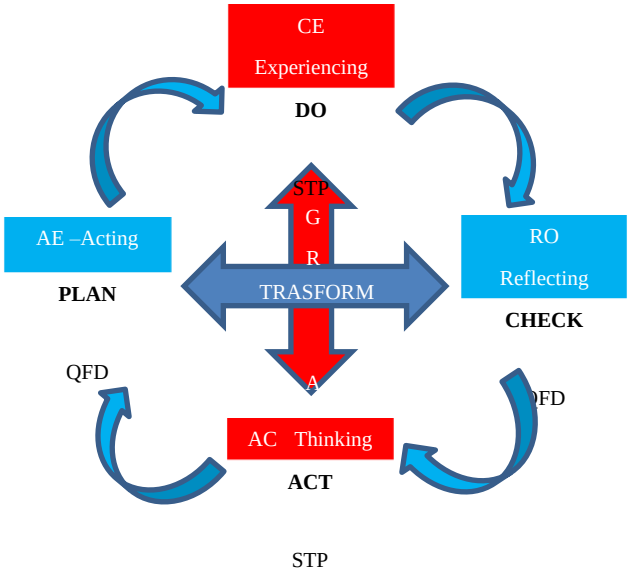

Figure 2. "Deming/Kolb cycle"

2.4.1. The Plan Stage

In the course design stage (Plan), carried out using QFD, Figure 3 (Verna, 2014), the educator defines the objectives of the course modules (and of the single lessons), in line with those defined in the planning of the course of studies (stakeholders' needs) and listening to the needs of the learners (entrance test) columns one and two. The students' needs are expressed in terms of homogeneity (upwards or downwards) or heterogeneity in the level of knowledge expressed by the class of incoming students (initial needs) with respect to the various course objectives. Based on the specific context of the needs, the educator identifies the most appropriate didactic strategies to satisfy these needs. The teaching strategies (figure 3) combine the different methods, tools and times selected by the educator for the pursuit of specific objectives (Verna, 2014).

2.4.2 The Do stage

The design stage of the course (Plan) is followed by the management stage of the teaching processes, (Do). The Do stage permits the educator to implement what has been planned to the different modules of the course. At the end of said stages (Plan, Do – *experiencing*) the educator will move on to the Check stage of reflection on the recently completed experience (*reflecting*).

2.4.3 The Check Stage

In this stage, the educator listens to the students' "learning needs" using quantitative and qualitative tools. Specifically, the Check stage enables the educator to reflect on the learning level achieved by the class of students with respect to the targets of the module just completed (LO) as well as reflecting on their own "learning needs". It should be noted that listening to the "learning needs" of educators, as against that of students, is implemented through the evaluation/self-assessment tools that monitor the key processes of teaching quality in a specific context (Verna, 2017; Verna et al., 2019).

The literature refers to the concept of teaching quality building blocks (Probst, Raub, & Romhardt, 2002; Ramsden, 2003) that some authors have organized (Chen, Chen, & Chen, 2014) into ten constellations. In L'Ascolto, the

"key processes" concern the design, management, evaluation and improvement of the teaching quality, while within the management phase (DO) some teaching quality "control areas" are monitored, namely, disciplinary skills, teaching strategies, communication and relational techniques. It should be noted that the "control areas" can be extended according to the educator's professional development in his/her specific context (Verna, 2017; Verna et al., 2019). In the Check stage, for example, at the end of the first course module, the educator gives the students a test to assess to what extent the targets of the completed module have been achieved. In addition to the end-of-module test, at the end of the first, intermediate and final module, the educator gives the students a course satisfaction questionnaire that focuses on the "control areas" of teaching quality mentioned above. If the results of the test (students' LO) are unsatisfactory, the educator fills in a self-evaluation questionnaire, mirroring the satisfaction questionnaire given to the students.

Relationships:	
5 – Strong relationship	+
3 – Medium relationship	-
1 – Weak relationship	X

Target/Needs \ Educational strategies		Needs	Strategy 1	Strategy 7	Strategy 3
			class/ tutorial	Role- playing/ tutorial/ class	Study Case / class
K&C Applied K&C	**1.** General accounting (objectives tools e methods) BASIC	9	+	-	
	ADVANCED	9	+	-	
	2. National and International accounting principles (conceptual framework, classification and analysis) BASIC	10	+	+	
	ADVANCED	10	+	+	
	4. Capital (definition, composition) BASIC	8	+	+	
	(configuration/determination) ADVANCED	9	+	+	
	4. Income (definitions, composition) BASIC	9	+	+	
	Configuration, determination ADVANCED	10	+	+	
	5. Budget (notions, discipline, characteristics) BASIC	10	+	+	
	ADVANCED	10	+	+	
K&C Applied K&C Judgment autonomy	**3.** Recognition of the main management operations (domestic and international markets) BASIC	9	+	+	x
	ADVANCED	10	+	-	-
	6. Balance sheet (composition., determination) BASIC	10	+	+	+
	ADVANCED	10	-	-	+
Weights of educational strategies			**645**	**589**	**139**

Figure 3. Initial QFD (adapted from Verna, 2014)

The comparison between the teacher's self-evaluation test and the student satisfaction test allows the teacher to listen to his/her own "learning needs", that is, to identify the "control areas" which require action to satisfy all the needs. Kolb (1984, p.41) considers learning as a mental process oriented towards a goal that requires conscious reflection. As already noted, learning is considered as a process of continuous construction and reconstruction, which occurs through the interaction of the individual's knowledge with the knowledge of the environment. Thus, the learning style is not a fixed psychological or cognitive trait, but rather the result of the interaction between the person and environment (Kolb & Kolb, 2013). Therefore, in this Check stage, the educator is prompted to reflect on the recently concluded teaching processes for one purpose: to bridge the gap between his/her initial training (before the start of the course) and that required to meet the students' "learning needs". The educator pursues this aim through continuous interaction with the environment in which he/she works (specific context).

Specifically, the educator can reflect on the recent experience in terms of:

- (Level of) satisfaction of students' "learning needs" (entrance test, end-of-module test, end- of-course test);
- (Level of) satisfaction of educators' learning needs (student satisfaction test/educator's self-evaluation);
- Teaching gap to be filled (the educator's reflection on the control areas on which action must be taken - self-training)

The Check stage, therefore, offers the educator the opportunity to reflect on the experiences achieved thanks to a plurality of systemic, dynamic and contextual information sources, that fuel the next stage, Act (thinking).

2.4.4 The Act Stage

This is the stage in which the educator develops teaching strategies to reduce the gap between students' actual learning (LO) and the ideal level (target). As noted by Coleman (1976), generalizing (abstract conceptualization) involves the ability to see a connection between actions and effects in a range of circumstances. In this sense, this stage provides the educator with the opportunity to formulate teaching strategies aimed at bridging the students' learning gap through the development of new knowledge. Hence, the teacher develops new strategies in terms of:

- solutions to problems that emerged in the "control areas" (disciplinary skills, teaching methodologies and communication and relational techniques);
- comparison with colleagues (best practices of educators who have worked in the same environment - target/needs/LO).

In the Act stage, the educator formulates his/her teaching strategies based on the information collected in the previous stage, to then experiment them in the Plan (Acting) phase. The cycle is repeated in the next module in which the educator experiments the formulated strategy and verifies its effectiveness (Check). When the outcome is positive, the educator has no need to formulate new teaching strategies, but having reached the Act (thinking) stage, she/he standardizes the strategies that proved successful by answering the questions present in the Standardization Forms for Teaching Professionalism (STP). The best practices of educators who have improved achievement to fulfil the LO in a specific context are standardized in these sheets. The STP consists of two sheets. The first sheet contains the teaching strategies that enabled the educator to achieve higher LO (i.e. 98% homogeneity of the class of students during the course or at the end) compared to specific targets and the relative initial needs of the students (Verna, 2017; Verna et al., 2019). The second sheet standardizes the choices related to the discipline and the communication and relational techniques that permitted the educator to achieve the results in that context (LO/targets/initial needs), Figures 4 and 5. Educators who find themselves working in the same conditions, can thus draw on a knowledge management and sharing system - STP - that allows comparison between peers (best practices). It should also be noted that the STPs represent the synthesis of a system of creation, management, sharing and conservation of knowledge deriving from a continuous process of design, management, evaluation and improvement of the quality of university teaching, guided by listening to and satisfying the needs of educators and students. In L'Ascolto, the satisfaction of the educator's needs is achieved when, in specific circumstances of target, initial needs and learning outcomes, the educator either evaluates the gap between the learning outcomes of students and the targets as the students progress, thus identifying the "control areas" on which action must be taken to reduce or remove this gap or, alternatively, chooses the best practices of another educator who has operated with success under the same conditions and in the same context" (Verna et al., 2019).

Target		STP 1 Teaching Strategies	Needs	L.O.
K&C Applied K&C		**Strategy 7. Class/tutorial**		
		Answer the following questions synthetically: **To whom** have you provided it? - To the class - To the individual student In pairs In teams Briefly illustrates whether this is a different case from the first **See Item 4** _____ **Such us**? - rules (if any) _____ _____ - Next steps _____ _____		
	4	- Example Yes / No _____ _____	8	80%
	5	- What tools did you use? _____ _____	9	
	6	**3. Why?** Did you offer students a reason to engage in listening (motivation)? What reason? _____ _____	10	90%
		4. Where is the class held? Did you change class during the lesson or used a particular place (e.g. computer room, company visit)? _____ _____ **Item 4**: adopts different methods so that individual work is alternated with that of group and pair work (score 1). **Brief description of the chosen solution**: The game created by the educator is an adaptation of tic-tac-toe for the reinforcement and summarizing of the course's basic contents (target of the last module of the course). The procedure was to divide the class into two teams and within each team the members worked in pairs. The answers to all the questions are finally summarized to the whole class by the educator and in a summary document (handout). The teacher leads the game by defining rules and times. The trio represented on the blackboard contains a number in each box corresponding to a question. The teacher chooses a student from both teams to hear the answer to the question.		
K&C A.K &C Jud. A.	3	**Strategy 1. Practical exercises / Lesson** …	9	80%
K&C A.K&C	1 2	**Strategy 8.** …	9 10	80% 85%

Figure 4. STP 1

<table>
<tr><td colspan="4">STP 2 Section1</td></tr>
<tr><td colspan="4">COMMUNICATION AND RELATIONAL TECHNIQUES</td></tr>
<tr><td colspan="4"><u>Problems that emerged</u></td></tr>
<tr><td colspan="4">Report in the following table the problems that emerged in the communication (verbal, non-verbal) and in the relationship with the students (self-assessment/lecturer and qualitative test/students) noting in the respective boxes the questions/questions of the test that highlight these problems.</td></tr>
<tr><td colspan="4">Target/Needs ……</td></tr>
<tr><td>Verbal Communication</td><td>Non-verbal Communication</td><td>Use of space</td><td>Relation with students</td></tr>
<tr><td>Item</td><td>Item</td><td>Item</td><td>Item</td></tr>
<tr><td colspan="4">Brief description of the chosen solution</td></tr>
<tr><td colspan="4">Results achieved: LO No problems emerged</td></tr>
<tr><td colspan="4">STP2 Section 2 - Content and their organization</td></tr>
<tr><td colspan="4">Target/Needs ……</td></tr>
<tr><td colspan="4">Item 4: the more complex topics are introduced gradually (score 3);
Item 11: every lesson begins with the presentation of the topics to be addressed and a summary of those already dealt with (score 3);
Item 12: at the end of the lesson there is a summary and reinforcement of the different topics addressed (score 2);
Item 16: reference is made to current (novel) aspects of the discipline (score 1)
Item 9: the contents of the subject are addressed with reference to practical and applicative aspects (score 2).</td></tr>
<tr><td colspan="4">Brief description of the chosen solution</td></tr>
<tr><td colspan="4">Item 4: …….
Item 11: ……
Item12: …….
….</td></tr>
<tr><td colspan="4">Results achieved: LO 80% - 90%</td></tr>
</table>

Figure 5. STP 2

In this sense, Deming's Plan, Do, Check and Act cycle, with its continuous repetition over time, directs the educator towards continuous learning cycles through concrete experiences (DO), transformed by reflective observation (Check) and expanded by abstract conceptualization (Act) and active experimentation (Plan-Do). By following the "Deming/Kolb cycle", the educator can learn by resolving the "creative tension" between the stages of experiencing, reflecting, thinking, and acting. Thus, the assumption of experiential learning is that learning is built from the experience gained in a specific context, in interaction with the knowledge that an individual already has at that moment.

Figure 2 shows how in the Do (experiencing) and Act (thinking) stages, the educator tries to understand his/her personal experience and in the Check (reflecting) and Plan (Acting) stages, to transform it into knowledge. Note how the transformation of the experience is summarized in schematic form in the QFD in which the Plan (Acting) and Check (Reflecting) stages are highlighted, while the understanding of the experience is highlighted (as well as in the Do stage) in the STP. It should be noted that this form makes the result of the educator's experiential learning "visible", i.e. the creation of knowledge. Ultimately, it highlights the creation of knowledge that took place as a result of the educator's experiential learning in the Deming/Kolb cycle (albeit in a synthetic form and limited to the best practices of educators in specific context conditions). The continuous repetition of the PDCA cycles in a specific context gives the educator the opportunity to "resolve" the "creative tension" between the stages of experiencing, reflecting, thinking and acting.

Hence, L'Ascolto fuels, in a structured and systematic way, a system that creates, manages and shares the knowledge deriving from the continuous exposure to experience in an endless cycle (Deming/Kolb) that allows

gradual, continuous improvements in the logic of experiential learning. As noted earlier, learning flexibility is the ability to use each of the four learning modes to move freely around the learning cycle and to modify one's approach to learning based on the learning situation (Kolb et al., 2014, p.218). The following paragraph presents the results of the experimentation of the approach of L'Ascolto in a university accounting course to highlight the effects of this approach on flexibility in the teacher's learning and teaching styles and on students' performance.

3. Method and Results

3.1 The "Deming/Kolb" Cycle in an Accounting Course

As noted, several times, the purpose of the work is to verify whether the approach of L'Ascolto supports the educator's use of the Kolb Experiential Cycle to develop flexibility in his/her learning and teaching styles and to verify whether this flexibility has a positive effect on student performance.

To this end, the holistic approach of L'Ascolto was tested in a university accounting course in the second year of a 3-year degree course in Economics and Management attended by 215 students, all of whom were involved in the experimentation.

The students' performances were evaluated by comparing the LO of the class of the students of the accounting course, both as they progressed and at the end of the course, with the knowledge possessed by the incoming students. The students were given an entrance test focused on the objectives of the course modules. As a whole, the class initially showed a poor knowledge of the discipline, or rather "downward homogeneity". As already noted, homogeneity/heterogeneity is determined by calculating the average of the marks and the standard deviation. This deviation allows you to determine the homogeneity (values close to the average) or heterogeneity of the level of knowledge possessed by the class of students. Students' needs are also listened to during the course, LO (dynamic aspect) as well as the related training needs of the educator (systemic aspect).

Before describing the methods of the experimentation, we recall that the PDCA stages of the "Deming/Kolb" cycle were presented in the previous paragraph, thus they will not be discussed in detail in this part of the paper. The reflection here focuses on the methods of experimentation and the results achieved. In particular, the two dialectically correlated modes of understanding experience and transformation of experience summarized respectively in the STP (initial and end-of-course, Fig. 4 and 5) and in the QFD (initial and end of course, Figures 3 and 6) are used to guide the understanding of these results. This schematic representation (figure 2) aims to highlight the listening to the "learning needs" (understanding of the experience) and the satisfaction of the same needs (transformation of the experience).

The educator started the experimentation from the Plan stage of the course design with the use of the QFD matrix, in which she divided the course into 6 modules (Fig. 3). The initial QFD highlights the Plan and Check phase in which the initial target/needs (of the students) and the teaching strategies that allowed the educator to satisfy these needs in previous years are reported (Verna, 2014; Verna & Perozzi, 2014; Verna & Pizzolitto, 2019). The final QFD (Fig 6) shows the Plan and Check stages reporting the students' target/needs and LO as the course progressed and the teaching strategies that allowed the educator to overcome unsatisfactory (high needs) LO.

The first and second columns of the initial QFD indicate the targets of the course modules and the relative initial needs of the students (entrance test) respectively, while the top row of the QFD matrix shows the teaching strategies (best practices) selected by the educator in the experimentations of previous years. In particular, the hierarchy presented in the QFD represents the standardization logic of the approach of L'Ascolto (Verna, 2017) according to which the teaching strategies (communication techniques and disciplinary skills) are organized, managed and shared in a systemic, dynamic and contextual way. It should be noted that these strategies are the result of the continuous improvement generated with the "Deming/Kolb" cycle in which the educator creates new knowledge based on the correlated (systemic) listening to the needs of teachers and students (and other stakeholders), repeated over time (dynamic) and with reference to the specific (target/needs/LO) and general (disciplinary, social, cultural) context. It should also be noted that in the experimentation of previous years not all the "control areas" of teaching quality envisaged in L'Ascolto were considered. However, in this work the experimentation was extended all the "control areas" (Verna, 2017, Verna et al., 2019). In the QFD, the targets of the course modules were classified according to the Dublin descriptors and divided into "basic" and "advanced" (Verna, 2014). The initial needs of students, as previously noted, are expressed in terms of the homogeneity (upwards or downwards) or heterogeneity shown by the class of students with respect to the course targets (Verna, 2014). These needs are also listened to during the course (dynamic aspect) and express the level of learning (LO) reached by the class of students (homogeneity/heterogeneity) at the end of each module (during the course).

The needs are determined by calculating the mean and the standard deviation of the student entrance test (and those during the course - L.O.) and translating the results obtained to a scale from 0 to 10. Thus, if the spread around the mean is great, the class is heterogeneous; on the other hand, if the values are all close to the mean the class is homogenous, (upwards – higher knowledge, or downwards – lower knowledge). This calculation is made for the class of students for every course target. The legend shows the symbols corresponding to values inserted in the centre of the QFD matrix by the educator, according to the stronger or weaker relationship between target/needs and teaching strategies. By multiplying the value present in the matrix for each need, we obtain the value that expresses the correlation, stronger or weaker, between the strategy and the target/needs (Verna, 2014).

The initial QFD (Fig. 3) shows how the class of students has a downward homogeneity (high "learning needs"). The most effective strategies identified by the educator in the QFD in relation to the needs expressed by the class of students, are strategies 1, 7 and 3. In relation to this initial situation, the educator implemented the PDCA cycle (in the manner seen above) and the students' LO are shown in the final QFD.

In particular, the educator implemented the lessons of the first module with the Do (experiencing) stage, after which, in the Check (reflecting) stage, she collected information (in the manner seen previously) on the students' LO, which, in this case, were only just satisfactory. In Fig.6, highlighting the LO column shows LO equal to 5.6 (in a range from 0 to 10) in correspondence with the target/needs of the first module. As noted, the lower the LO the lower the "learning needs" of the students. In the Act (thinking) stage, the educator modified strategy 1 by formulating a new strategy based on the information provided by the Check (reflecting) stage. Specifically, the student satisfaction questionnaire shows very low values for questions 4, 11 and 12 of the "control area" relating to disciplinary skills. The values attributed to each item can vary from 1 to 5 (Absolutely No - No - neither Yes nor No - Yes - Absolutely Yes).

The items in question are listed below:

- (Item 4) the more complex topics are introduced gradually (score 3);
- (Item 11) every lesson begins with the presentation of the topics to be addressed and a summary of those already dealt with (score 3);
- (Item12) at the end of the lesson there is a summary and reinforcement of the different topics addressed (score 2).

In the self-evaluation questionnaire, the educator had similar values for items 11 and 12, while she had given a high value (score 5) for item 4.

This information allowed the educator to activate the Act (thinking) stage in which she decided to modify strategy 1 by introducing a new strategy, 8 (Fig. 6). In particular, in order to respond to the students' "learning needs" as expressed with items 11 and 12, the educator decided to integrate strategy 1 with a short closed-case focused on the topics to be addressed during the lessons. The case is used by the educator at the beginning of each lesson of the module as a presentation of the topics to be addressed and at the end of the lessons as a summary and reinforcement. Regarding item 4, the educator decided to reduce the topics related to the module's objectives, focusing instead on the fundamental aspects, to be gradually expanded and reinforced with the new strategy 8. At this point, the educator experimented the strategy formulated (in the thinking stage) in the next Plan stage, starting a new "Deming/Kolb" cycle, which with the Do stage, offered the educator a new experience. The information deriving from the next Check phase shows very positive LO, i.e. very low values (1, 2) both concerning the reinforcement of the objectives of the previous module and the one just concluded (module 2 "National and international accounting principles/10"). In this case, in the Act (thinking) stage, the educator limited herself to standardizing strategy 8 in the STP (Figure 4 and 5), which will allow other colleagues in the same contextual conditions to consider this strategy.

Educational strategies / Target/Needs		Needs	L.O.	L.O. (Act)	Strategy 1	Strategy 7	Strategy 3	Strategy 8
					class/ tutorial	Role-playing/ tutorial/ class	Study Case / class	Close case/ class/ tutorial/ close case/
K&C Applied K&C	1. General accounting (objectives tools e methods) BASIC	9	5	2	-	-		+
	ADVANCED	9	6	2	-	-		+
	2. National and International accounting principles (conceptual framework, classification and analysis) BASIC	10	1		-	+		+
	ADVANCED	10	2		-	+		+
	4. Capital (definition, composition) BASIC	8	3	1	-	+		
	(configuration/determination) ADVANCED	9	4	2	-	+		
	4. Income (definition, composition) BASIC	9	3	1	-	+		
	Configuration, determination ADVANCED	10	3	1	-	+		
	5. Budget (notions, discipline, characteristics) BASIC	10	3	2	-	+		
	ADVANCED	10	4	2	-	+		
K&C Applied K&C Judgment autonomy	3. Recognition of the main management operations (domestic and international markets) BASIC	9	5	2	+	+	x	x
	ADVANCED	9	6	2	+	-	-	-
	6. Balance sheet (composition., determination) BASIC	10	2		+	+	+	+
	ADVANCED	10	2		-	+	+	+
Weights of educational strategies					452	606	139	326

Figure 6. Final QFD

The cycle continued in the subsequent modules in the same manner, with module 3 highlighting unsatisfactory LO - 5 and 6 (with respect to the target/needs, “Recognition of the main management operations (domestic and international markets)/9”).

The information provided by the Check stage of reflecting highlights some items of the student satisfaction questionnaire (again relating to disciplinary skills) that have modest values:

- (item 16) reference is made to current (novel) aspects of the discipline (score 1)
- (item 9) the contents of the subject are addressed with reference to practical and applicative aspects (score 2).

In this case, there were equally modest values in the educator's self-evaluation questionnaire.

In the Act (thinking) stage, the educator decided not to formulate a new strategy, but to use the practical application envisaged in the strategy to do exercises on sample cases taken from sector journals, integrated with handouts and further practical cases.

The subsequent experimentation in the Plan and Do stages, allowed the educator to experiment strategy 1 in the experiencing stage (Do) and to evaluate the LO in the reflecting (Check) stage. In this case also, there were positive LO (very low values) that allowed the educator to standardize strategy 1 that was already present in the STP (Fig. 4 and 5). Standardization was limited to additions made by answering the questions required by the disciplinary skills standardization sheet. The aim is to allow continuous improvements in the formulation (thinking) of the proposed teaching strategies (teaching styles) for the benefit of all educators who work in the same contextual conditions. The teaching style can be considered as the combination of teaching methods and techniques preferred by an educator for conducting his/her lessons (Visser et al., 2006).

Ultimately, the strategies created by the educators (best practices) in the experiential learning process are accepted in the STP in a systematic way in order to allow the management and sharing of knowledge (teaching style) between educators who operate in the same context conditions. In this sense, L'Ascolto supports the educator in developing flexibility in teaching styles.

The results of the subsequent modules (4 and 5) were both positive (3 and 4) though not excellent, but the information offered by the Check stage allowed the educator to reflect on the possibility of further improving these results (filling the learning gap).

In particular, the last student satisfaction test (module 5) showed modest values compared to an item relating to teaching strategies:

- (item 4) adopts different methods so that individual work is alternated with that of group and pair work (score 1).

In the self-evaluation questionnaire, the educator had attributed a negative evaluation to the same item, justifying the choice with the number of students in the classroom (215). Considering the positive results shown by strategy 7 in the experiments conducted in previous years in the same context conditions and target/needs (Verna, Pizzolitto, 2019), the educator decided to adopt this strategy using an unusual activity: play. The game created by the educator is an adaptation of tic-tac-toe for the reinforcement and summarizing of the course's basic contents (target of the last module of the course). The procedure was to divide the class into two teams and within each team the members worked in pairs. The answers to all the questions are finally summarized to the whole class by the educator and in a summary document (handout).

The positive results of strategy 7, integrated by the game, are confirmed in the last module of the course both with respect to the reinforcement of the objectives of the previous module and the one just concluded, in which the students' LO are minimal (2).

As observed previously, the STP (Fig. 4 and 5) therefore highlights the result of listening to the experience (experiencing) and the elaboration of the educator's teaching strategies (thinking) or teaching styles (best practices) in a specific context (target /needs/LO). Considering the systemic and dynamic (holistic) approach on which L'Ascolto is based, this STP can show any flexibility in the educator's teaching styles (best practices) in terms of new formulations of teaching strategies (or the replacement of a strategy with another, or even additions to the strategy itself) in relation to the students' LO over time. Specifically, in the STP, the teaching strategies that have allowed the educator to achieve the most satisfactory LO (values close to zero) during the course are standardized in hierarchical order. The QFD matrix, on the other hand, offers a systemic and dynamic vision of the process of satisfying the initial and ongoing "learning needs" of students and teachers. As noted previously, the QFD shows a summary of the Check (reflecting) and Plan (Acting) stages of experience transformation that modifies behaviour, or that leads to flexibility in learning. This flexibility is the ability to use each of the four learning modes to move freely along this learning cycle, modifying one's behaviour according to the learning situation (Kolb, 2014).

4. Conclusions and Discussion

The research questions the paper proposed can be answered in the following considerations. The experimentation stage made it possible to observe how the Deming PDCA cycle urges the educator to go through the stages of experiencing, reflecting, thinking and acting in a continuum of teaching processes related to the needs of both educators and students (in a correlated way) and to their own context, or in a holistic way. Ultimately, the PDCA cycle guides the educator to develop skills in all stages of the Kolb Experiential Cycle in order to "move freely around the learning cycle and to modify one's approach to learning based on the learning situation". It should also be noted that the understanding of the experience schematically summarized in the STP, highlights the flexibility of the educator's teaching styles (strategies 8, 7 and 1). This result arises from the continuous feedback process offered by the check/reflecting stage, which allowed the educator to collect information and then formulate/modify or replace the strategies initially defined (initial QFD, strategies 1,7 and 3). The experimentation and evaluation in

the next cycle, allowed the educator to modify her behaviour providing a "training" in learning flexibility. In this sense, it is possible to say that the approach of L'Ascolto solicits and supports the development of the educator's experiential learning. This flexibility in the educator's learning and teaching styles was achieved in compliance with the complexity of teaching, namely, in the systemic, dynamic and contextual links it possesses. Thus, L'Ascolto is presented as a holistic approach aimed at the continuous improvement of training processes and continuous learning for educators and students in a systemic, dynamic and contextual way. In this sense, it is possible to consider this approach as a pedagogical model for the continuous training and self-training of educators and students in their context of place, time and relationship.

As regards the students' performance (LO), although the response to the variation in the educator's teaching strategies was positive, in the author's opinion the data are significant but not sufficient.

Experimentation with the holistic approach of L'Ascolto would be necessary over the entire course of study. In this way, it would be possible to evaluate the effect of the flexibility in the teaching styles of all the study course's educators on student performance. Furthermore, the knowledge management and sharing system - STP (teaching styles/best practices) would facilitate the experiential development of educators in their context.

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Note 1 L'Ascolto® is currently an experimental, multidisciplinary project of the G. d'Annunzio University that has decided to finance the creation of a web platform that reproduces the L'Ascolto® approach based on algorithms (Ida Verna, "Procedure for the design, management, evaluation/self-evaluation and improvement of teaching processes", Public deed filed with a notary of the Italian Republic, 27.01.2017). L'Ascolto® is a holistic approach to university teaching aimed at improving education and training based on the principles and methods of Total Quality Management - TQM (Feingembaum, 1956; Juran, 1962; Deming, 1951). This approach is an evolution of the Teaching Evaluation Model (TEM) based on the Deming cycle (Deming, 1951) and aimed at the continuous improvement of individual university courses (Verna, 2008; Verna, Perozzi, 2010, Verna, 2012). TEM experimentation over the years (Verna, Perozzi, 2014) has led to an integration of this approach with another Quality method (Verna, 2014), that of Quality Function Deployment (Akao, 1990). Subsequent reflections on the complexity of teaching (systemic, dynamic and contextual) and on the context in which it operates, made it possible to extend the approach to the overall teaching processes, that is, to the Course of Studies and individual teaching units considered as a single whole (Verna, 2017).

Note 2 The course targets are defined by the educator in relation to the general objectives of the course planned during the design of the course of studies after heeding the needs of the social partners. In this work, as specified in the body of the text, we limit ourselves to examining the single course unit, therefore, the specific teacher-student relationship.

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The Relationship Between Tourism Destination Image, Perceived Value and Post-visiting Behavioral Intention of Chinese Tourist to Thailand

Bing Zhang[1], & Eksiri Niyomsilp[2]

[1] PhD Candidate, Management, School of Management, Shinawatra University, Thailand

[2] School of Management, Shinawatra University, Thailand

Correspondence: Bing Zhang, PhD Candidate, Management, School of Management, Shinawatra University, Thailand.

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Abstract

The aim of this research was to study the relationship between tourism destination image, perceived value and post-visiting behavioral intention of Chinese tourist to Thailand. The methodology of this study is quantitative research in which questionnaire is the major tool in collected the primary data for analysis. The total sample of 400 Chinese tourists to Thailand was obtained for the analysis. The results of this study indicated that there is a significant positive impact of destination image on post-visiting behavioral intention; There is a significant impact of perceived value on post-visiting behavioral intention; There is a significant impact of destination image on perceived value; Perceived value plays a partial mediating role in the influence of tourist destination image on tourists' post-visiting behavioral intention. In order to enhance the competitiveness of tourism destinations, the study results suggest that organizations and marketers relevant to tourism industry in Thailand should improve the image of tourism destination and enhance the perceived value of tourists.

Keywords: tourism destination image, post-visiting behavioral intention, perceived value

1. Introduction

Since entering the 21st century, the market competition among tourist destinations has become more fierce. In order to maintain market competitiveness, tourist destinations face the dual pressure of developing new markets and maintaining existing markets. Because the tourist destination is relatively familiar with the existing market and can carry out marketing activities to the target market at its own preference, it will save marketing costs to maintain the existing market rather than to open up a new one. In addition, revisiting tourists not only stay in the tourist destination longer than the first-time tourists, but also do free publicity for the tourist destination in the form of word-of-mouth publicity. Therefore, attracting tourists to visit again is of great significance to the survival and development of tourist destinations.

2. Research Questions

According to the research statement of the problems explained above, this research make an effort to answer the following four questions:

1. What’s impact of tourism destination image on perceived value

2. What’s impact of perceived value on post-visiting behavioral intention ?

3. What’s impact of tourism destination image on post-visiting behavioral intention.

4. How does perceived value affect the relationship between destination image and post-visiting behavioral intention ?

3. Research Objectives

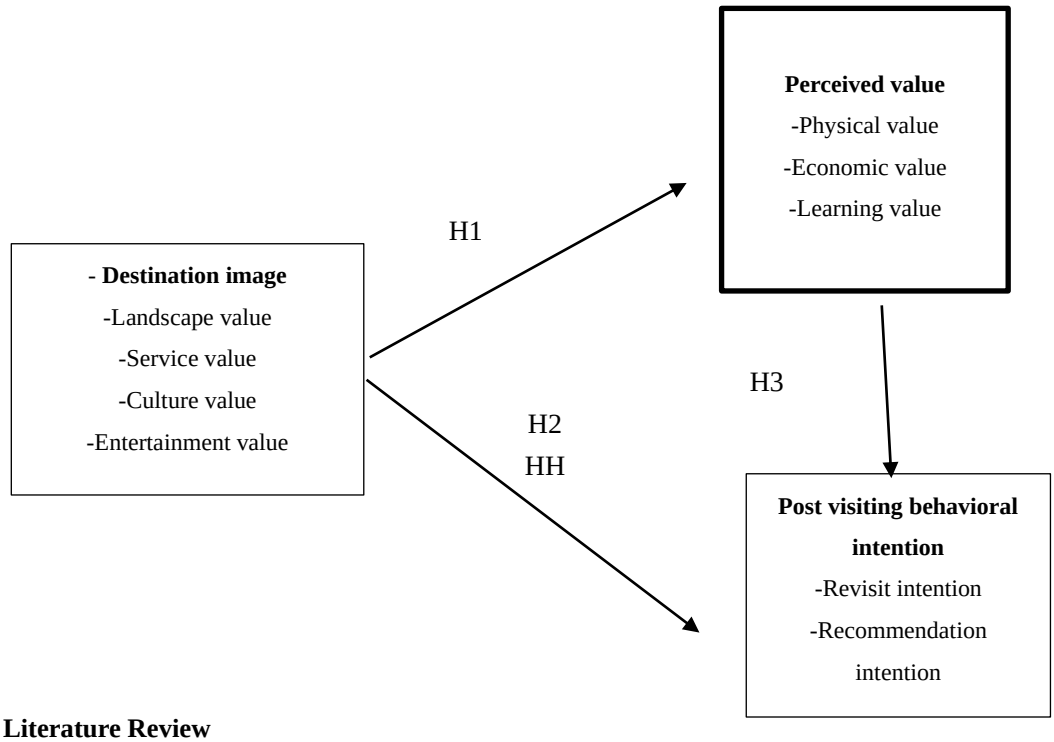
1.To identify study the impact of tourism destination image on perceived value.

2.To study the impact of perceived value on post-visiting behavioral intention.

3.To examine the impact of destination image on post-visiting behavioral intention.

4. To examine the mediating role of perceived value between destination image and post-visiting behavioral intention.

4. Conceptual Framework



5. Literature Review

5.1 Connotation of Tourism Destination Image

Chi and Qu (2008) proposed, The psychological representation of the basic understanding, feeling and overall perception of certain destinations mastered by individuals is called destination image. Guan Xinhua et al .(2015) think that the overall impression of the individual is the image of the tourist destination. Chen et al .(2016) pointed out from the perspective of tourism marketing, For potential visitors, The destination image can show the advantages and disadvantages of the destination, It is an important foundation of destination marketing. Endah (2017) put forward that the image of tourist destination is the individual's own cognition of destination, can act as a driver of the decision making process. From the above review of the relevant literature. Based on the above review of its concept, This paper adopts the generally accepted definition of tourist destination image, That is, all the views, including beliefs, opinions and impressions, formed by tourists on tourist destinations.

5.2 Tourism Destination Image Study

Since 1970s, the study of tourism destination image has gradually become an important subject in the field of tourism destination marketing Scholars study the types of tourist destination images from various perspectives. Gunn(1988) from the perspective of tourists, Tourism destination image is divided into two categories: original image and induced image. The original image refers to the impression of the tourist before reaching the destination, This impression is mostly because of news, books, television, network and other media spread and formed; Induced image is the tourist destination through a variety of channels to introduce tourists about the advertising, publicity, promotion and so on, So that tourists can form an impression of the place. Fakeye、Crompton(1991) according to the previous research, Tourism destination image is divided into three categories: original image, induced image and comprehensive image. Among them, Comprehensive image refers to the comprehensive information produced by tourists after visiting their destination, It also includes previous knowledge of the site. Gartner(1993) study again optimizes the type of destination image, Put forward the "three-dimensional structure ", That is, cognitive image, emotional image and moving image. This article also describes the cognitive image, He believes that the cognitive image is not only determined by the tourists' perception of the image of the place, Also determines the non-local residents of the image of the [53] perception. Cleary(1999) through research, the tourist destination image consists of cognitive image, emotional image and

overall image, known as "new three-dimensional structures ". Son(2005) classified from subjective to objective, The image of tourist destination is divided into conceptual image and evaluation image, Among them, Conception image refers to tourists' understanding of the environment of tourist destination, Evaluation image refers to the cognitive image and emotional image of tourists. On the basis of the above four dimensions, the article further refines the image of the tourist destination emotion into six dimensions, adding the two dimensions of "disliked, liked, interesting and boring.

Bai Liming (2007), a domestic scholar, constructed a "three-dimensional measurement model of tourism destination image" from the perspective of methodology: the actual image, the launch image and the perceived image of the tourism destination image of Yangshuo in Guilin are scientifically and comprehensively measured and compared. Hu Xianyang, Bai Kai and Wang Li (2013), based on the theory of image restoration, summed up the image restoration table of tourist destination, and divided the strategy of destination image restoration into six dimensions: denial, evasion of responsibility, attack, reduction of external attack, correction action, formal greeting, recognition and apology. At present, scholars at home and abroad basically agree with the "new three-dimensional structure ", and after a more in-depth study, it also confirms that the structure is also applicable to the cultural background of China. Zhao Jingyuan, Ma Peng, Lu Zhengying (2013) divided the destination into environmental image, service facility and product image, function image; Bai Zhiping (2015) divided the destination image into scenic spot landscape natural characteristics, scenic spot reception service and management, infrastructure construction and service, cultural environment, city impression several factors; Shi can (2018) evaluated the destination image from the aspects of scenery and sanitation, scenic spot price, scenic spot service, infrastructure.

On the basis of previous studies, domestic and foreign scholars have further expounded the elements of tourism destination. Scholars at home and abroad have different views on the whole tourist destination, and the emphasis on the elements of the tourist destination image will be different. From the point of view of tourists, the experience of tourists is divided into different categories and elements. From the integrity of tourism image, let tourists give the impression of tourist destination. The following table lists scholars' research on the elements of tourist destination

5.3 Connotation of Perceived Value

Zeithaml (1988) through research, First put forward the concept of customer perceived value, Mainly based on the psychological perspective. He showed, In service contacts, An individual's overall assessment of goods or services. Then, Some scholars put forward different views. Woodruff (1997) in his research, Perceived value refers to the use of a product by an individual in a given situation, evaluation of the performance of the target product and the effect after use, This can facilitate or hinder the customer's own purchase intention. Morrison(1998) put forward that the perceived value of tourists is based on their own cost and income comparison, so as to psychological evaluation of the products and services provided by tourism companies. Duman and Mattila (2005) In their research, it is shown that the perceived value of tourists is the subjective result of comparing the experience of tourists in tourism with the money and time they spend. Huang Yinghua and Huang Fucai (2007) define the perceived value of tourists from the perspective of satisfying tourists' expectations. It is a comprehensive evaluation of consumption experience, preference and knowledge and their input and performance in tourism consumption. Li Wenbing and Zhang Hongmei (2010) studied the perceived value of tourists in a specific situation from the perspective of the benefits and losses experienced by tourists. It also points out that it is the overall evaluation of tourists for the various commodities and services provided to tourists by relevant personnel that meet their needs. To sum up, the perceived value of tourists used in this study is the subjective result of comparing the experience of tourists in tourism with the money and time they spend.

5.4 Perceived Value Study

The measurement of tourist perception value has always been a hot issue in academic circles. There are two ways to measure, One is to explore the relationship between perceived value and tourism destination image, service quality and other variables. In the literature on this category, In measuring perceived value, Most scholars adopt a holistic, non-specific approach. The foreign scholars Duman and Mattila(2005)、Chen and Tsai(2007), as well as Chen and Chen(2010) measure the perceived value by using a single dimension scale including five topics. Chinese scholars Su Lujun and Huang Fucai (2010) and Guo Anxi (2013) also used a single dimension to measure the perceived value of tourists, Includes four measurement items. Other The other is to explore the perceived value of tourists in a particular tourism situation and analyze their measurement dimensions. This type of research focuses on its multi-dimensional structure. Sanchez et al .(2006) explored the perceived value of tourists to the purchase of tourism products in their article and developed a scale covering six dimensions. Ma

Ling and Bao Jigang (2012) and Cai Weimin (2015) summed up seven dimensions of perceived value. Guo Anxi et al .(2019) verify the influence mechanism of tourist perceived value dimension on revisiting intention from four dimensions of perceived value-based on the perspective of team tourists

Through the review of the relevant literature, we can see that in different situations, scholars have divided the perceived value into different dimensions. This paper mainly discusses the relationship between perceived value and other variables. Therefore, the four-dimensional scale is used to measure the perceived value of tourists.

5.5 Connotation of Behavioral Intention

Fishbein and Ajze(1975) studies show that behavioral intention is the willingness intensity of specific actions made by customers in the future. It has both potential real purchase actions in the future and the intention to introduce them to others for specific goals. Zeithaml et al. (1996) proposed that behavioral intention refers to people having subjective The conscious judgment of various behavioral tendencies that may occur in the future. Lee et al. (2007) and Chen and Tsai(2007) studies show that, Behavioral intention is that individuals may revisit the same destination and recommend it to others in the future. Žabkar et al .(2010) proposed, Tourist behavior intention is that tourists participate in tourism and experience tourism activities, For tourism products or services already purchased, Possible future actions, Among them, the most representative is the possible future intention of tourists and the possibility of publicity to others. Hyun et al. (2011) show that behavior intention refers to the possibility of positive evaluation, recommendation to others and possible re-occupation in the future. Li Wei (2016) believes that a series of follow-up behaviors generated by tourists under the stimulation of various elements of the consumption place are called behavioral intentions Based on the above discussion, this study adopts the existing definition, that is, the intention of tourist behavior refers to the possibility that tourists may recommend to others and re-visit themselves in the future after visiting a certain destination.

5.6 Behavior Intention Study

The measurement of tourist behavior intention is usually composed of multiple dimensions. Parasuraman et al. (1996) measure the customer's behavioral intention in the measurement of tourism-related research through five aspects: premium purchase intention, loyalty, internal response, behavior transformation and external response, Relevant scholars also put forward different measurement dimensions. Castro et al. (2007) summarized the future behavior intention of tourists into two indicators, They are the intention to revisit the destination and the intention to recommend the destination to others. Prayag and Ryan (2012) point out that the most commonly used variables used to capture tourist behavior intentions associated with tourist destinations include revisiting destination intentions, recommending destination intentions to others, and word of mouth dissemination. Jin et al. (2013) define behavioral intention as the possibility of revisiting the destination and the possibility of recommending the destination to relatives, friends and others in the future. Han Chunxian (2015) showed that, The measurement dimension of customer's future behavior loyalty is also applicable to the study of tourist behavior in tourism related research fields, Refers to the willingness of tourists to recommend or visit the destination again. Yang Ni et al. (2015) proposed the tourist behavior intention, With the will to recommend to others, There is also a willingness to visit again in the future. Liu Jingyan and Jing Jinjing (2015) proposed that tourist behavior intention can be measured by revisiting, sharing and recommending three indicators. Tu Hongwei et al. (2017) also used two indicators to measure tourists' behavior intention, It is also called mixed loyalty.

Through the review of relevant literature, it can be found that "recommendation" and "revisiting" are regarded as two important measurement dimensions, which have been recognized by many scholars. This paper draws lessons from many achievements and adopts "recommendation intention" and "revisiting intention" as the measurement dimension. The recommendation intention indicates the possibility that the individual introduces to the friends and relatives around him (Prayag G et al.2015). The willingness to revisit indicates the possibility of individuals returning to play in the future (Papadimitriou D et al.2015)

6. Research Hypothesis

6.1 Relationship between Tourism Destination Image and Perceived Value

The close relationship between tourist destination image and perceived value has always been the focus of scholars. Cheng and Lu (2013) explore the causal relationship between tourism destination image and perceived value, and the results of structural equation model show that there is a positive correlation between them. Aliman et al .(2014) investigated 482 visitors visiting lankavi in 2013 and verified the effect of three variables, namely, tourist expectation, perceived quality, and destination image, on perceived value and tourist satisfaction. regression analysis showed that destination image was positively correlated with perceived value, and

destination image was the most important antecedent variable of tourist perceived value compared with other independent variables. Lban et al .(2015) take the festival tour as an example. The results show that the image of tourist destination affects the perceived value and further affects the intention of tourists to visit again.

6.2 Relationship Between Perceived Value and Tourist Behavior Intention

The perceived value of tourists will not only have an effect on the individual's decision before the trip, but also on their related behaviors after the visit (Lee et al.2007). The research shows that in-depth study of perceived value is helpful for tour operators to understand tourists' current and future behavioral intentions, and can be used as an effective predictor of tourists' behavioral intentions (Cheng et al.2013). After their investigation, Hutchinson et al. (2009) showed through data that the positive perceived value of golf tourists led to their positive behavioral intentions (such as revisiting intentions and word-of-mouth communication).Cheng and Lu (2013) confirmed that tourists' perceived value has a positive impact on their intention to revisit. The study of Wu et al. (2016) also confirmed that the destination value perceived by tourists after playing is significantly positively correlated with the possible behavioral intentions of tourists in the future

6.3 Relationship Between Tourist Destination Image and Tourist Behavior Intention

For tourists, image is very important. Through in-depth and thorough analysis of tourist destination image, a series of behaviors that tourists may show in the future can be further analyzed. As far as tourists themselves are concerned, destination image not only influences tourists' views on the place, but also influences decision-making process and behavioral intention (Lin et al.2016, Kim et al.2013). Kaesung et al. (2013) investigated tourists participating in Korean sports events and found that destination image has a positive effect on tourists' behavioral intention. Liu et al. (2015) investigated mainland tourists visiting Macau and verified that there was a significant positive relationship between destination image and actual tourists' behavioral intentions. Fu et al. (2016) investigated relevant tourists visiting reality shows and also confirmed that destination image was positively correlated with recommendation intentions. Based on the above, this study proposes the following hypothesis:

H1 Destination image has a significant positive impact on the perceived value.

H2 Destination image has a significant positive impact on the post-visiting behavioral intention.

H3 Perceived value has a significant positive impact on post-visiting behavioral intention.

H4 Perceived value plays a mediating role between destination image and post-visiting behavioral intention.

7. Research Methodology

This study is a quantitative research design using survey questionnaire to collect data from Chinese tourists who have finished their tour. Population in this current research are 9.2 million Chinese tourists . Since there is a known population size, the author applied Yamane’s Table for the sample size. The result presents 400 samples. The sampling and questionnaire distribution were conducted based on purposive approach. The departure halls of Don Mueang International Airport and Suvarnabhumi International Airport were chosen as the sites for the distribution of questionnaires. After the data collection, the reliability of the data would be tested by Cronbach’s Alpha testing. The score was 0.933. A five-point Likert type scale was used to measure each variable. After the completion of the data process, descriptive, correlation and regression analysis is conducted to test study hypotheses and answer the research questions .

8. Findings and Discussion

The results of correlation analysis of the relationship of tourism destination image, perceived value and post-visiting behavioral intention are as follows:

Table 1. The Relationship of Tourism Destination Image, Perceived Value and post-visiting Behavioral Intention

	landsc image	service	entertainment	culture	total	physical value	Economic value	learning value	total	revisit intention	recommendation	total
Landscape image	1											
Service image	.354**	1										
Entertainment image	.339**	.230**	1									
Culture image	.280**	.248**	.278**	1								
total	.718**	.648**	.701**	.661**	1							
Physical value	.439**	.228**	.398**	.218**	.474**	1						
Economic value	.433**	.315**	.242**	.172**	.422**	.368**	1					
Learning value	.478**	.352**	.339**	.289**	.713**	.442**	.436**	1				
total	.816**	.385**	.417**	.294**	.699**	.755**	.757**	.829**	1			
Revisit intention	.204**	.125*	.620**	.245**	.454**	.266**	.154**	.195**	.260**	1		
Recommendation intention	.307**	.251**	.265**	.922**	.638**	.224**	.192**	.313**	.316**	.226**	1	
total	.317**	.229**	.590**	.689**	.680**	.315**	.217**	.314**	.362**	.839**	.719**	1

The results of Table 1 indicate that There is a significant positive correlation between landscape image, service image, entertainment image, cultural image and physical value, economic value learning value, revisit intention and recommendation intention; physical value, economic value and learning value have significant positive impact on re-visit intention and recommendation intention, which support H1, H2, H3.

Table 2. Mediating Effect of Perceived Value Between Destination Image and post-visiting Behavioral Intention

Independent variables	Dependent variables		
	behavioral intention	Perceived value	Post-visiting behavioral intention
Destination image	.680***	.699***	.532***
Perceived value			.221***
F	341.467***	379.750***	188.191***
R	0.462	0.488	0.487

Note：*P<0.05，**P<0.01,***P<0.001

Table 2 shows that the destination image is an independent variable and the post-visiting behavioral intention is a dependent variable. The destination image has a significant positive effect on the post-visiting behavioral intention (β=0.680, P<0.001); and regression 2 destination image is an independent variable and the perceived value is a dependent variable. The destination image has a significant positive effect on the perceived value (β=0.699, P<0.001) ; Regression 3, with destination image and perceived value as independent variables, post-visiting behavioral intention as dependent variable, destination image has significant positive effect on behavioral intention (β=0.532, P<0.01), which is less than the coefficient in regression 1. It shows that the perceived value plays a partial mediating effect in the influence of the destination image on the post-visiting behavioral intention, which supports H4.

The close relationship between tourism destination image and perceived value has always been the focus of scholars. Lban et al .(2015) take the festival tour as an example, the results show that the image of the tourist destination affects the perceived value and further affects the tourist's intention to visit again; there is a significant impact of destination image on behavioral intention. As far as tourists themselves are concerned, the

image of destination not only affects the tourists' views on the place, but also affects the decision-making process and behavior intention; perceived value of tourists not only plays an important role in the pre-visit decision, It will also play a role in their related behavior after sightseeing. Petrick (2004) noted that, Perceived value can have an effect on the intention of tourists to recommend destinations and their intention to revisit in the future, In other words, Higher perceived value will lead to greater recommendation and revisiting intention, perceived value plays a partial mediating effect in the influence of the destination image on the behavioral intention.

9. Conclusion and Recommendations

9.1 Conclusion

For the destination, the tourist's revisiting behavior can not only help to reduce the marketing cost of the enterprise, but also make the destination maintain a high number of tourists, realize stable economic benefits, and even play the role of information dissemination channel. Spread word of mouth to potential tourists. This paper reviews and summarizes the relevant literature of previous scholars, and discusses the role of destination image on behavior intention. The selected sample is Chinese tourists in Thailand. Tourism destination image is the starting point of the theoretical research framework. Taking perceived value as the research path, this paper constructs the model of tourism destination image, perceived value and tourist behavior intention, and makes an empirical study on it through correlation analysis and regression analysis. Moreover, the mediating effect of perceived value is analyzed, and the following research conclusions are drawn in this study.

(1) tourism destination image positively affects the perceived value of tourists. This paper uses empirical test to find that perceived value will increase with the improvement of destination image. That is to say, tourists will feel a better tourist image after the destination tour, and tourists will feel that the value of this trip is higher. This is consistent with the previous research conclusions, indicating that the perceived value of tourists after travel and play has a great relationship with the image of tourist destination.

(2) Perceived value positively influences the behavior intention of tourists. The empirical results show that the higher the perceived value, the stronger the future behavior intention. Therefore, the perceived value of passengers can not only directly affect the behavior intention of tourists, but also play an intermediary effect between destination impression and behavior intention.

(3) The image of tourist destination has a positive influence on the behavior intention of tourists. Through the data analysis, the results show that the perceived value will increase with the improvement of the image of the tourist destination, and the behavior intention of the tourists in the future will increase with the enhancement of the perceived value. Therefore, destination image can not only directly affect behavioral intention, but also indirectly affect it through perceived value.

(4) Perceived value plays a partial mediating effect between destination image and post-visiting behavioral intention of Chinese tourists to Thailand. Through the test of mediating role, the destination image has a significant positive effect on the post-visiting behavioral intention ($\beta=0.680$, $P<0.001$); The destination image has a significant positive effect on the perceived value ($\beta=0.699$, $P<0.001$); destination image has significant positive effect on post-visiting behavioral intention ($\beta=0.532$, $P<0.01$), which is less than the coefficient 0.680. It shows that the perceived value plays a partial mediating effect in the influence of the destination image on the post-visiting behavioral intention.

9.2 Recommendation

Based on the findings, some recommendations for the organizations are suggested as follows:

(1) Enhance the image of tourist destination. The good image of tourist destination can improve the perceived value of tourists, and then improve their recommendation intention and re-visit intention. Therefore, it is of positive significance to optimize the image of tourist destination.

(2) Improve the perceived value of tourists. If a tourist destination wants to enjoy a high reputation, so that tourists have the idea of repeated play, it should first ensure that tourists are provided with a high value tourism experience, so that tourists can really realize that the tour is worth the money when weighing the benefits received and the time, money and energy paid. In order to enhance the perceived value of tourists, tourism destination enterprises should strive to improve the quality of tourism products and services, provide authentic products and services; on the other hand, tourist destinations should provide reasonable prices for food, accommodation, transportation, tourism, shopping, entertainment and other industries, so that tourists feel that consumption is worth it in the course of tourism. The quality and price of services received are commensurate with the time and money spent. In order to establish a close relationship between passengers and destinations, and finally achieve the purpose of return visit and recommendation.

9.3 limitations and Future Research

(1) this study selected Thailand as a tourist destination, the conclusion of the study may with similar tourist destinations in Thailand, which is not enough to reflect the general situation of different countries in the world. The future research can select other types of tourist destinations which are different from Thailand as the research object, and test the validity and universality of the research conclusions.

(2) the research time of this study is concentrated in September-December, because the time limit does not carry on the long-term and repeated investigation, the research result may have the deviation. Therefore, in future studies, we can try to collect samples at different times or expand the recovery time of samples, so as to reduce the possible sample deviation. Thus, the results of the same tourist destination at different seasons are tested.

(3) this study, we explore the influence mechanism of the independent variable of tourist destination image on the dependent variable of tourists' possible behavior intention in the future, and select the perceived value as the intermediary variable. Other variables that may have a related impact on tourist behavior intention are ignored. Therefore, in the future, we can try to add variables such as psychological distance to improve the study of this paper.

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Potentiality of Islands Based Tourism in Bangladesh: A Qualitative View from Existing Literature

Sanjoy Kumar Roy[1], Muhammad Abdus Salam[2], SM Nazrul Islam[3], Md. Al-Amin[4]

[1] Lecturer, Department of Tourism and Hospitality Management, Noakhali Science and Technology University (NSTU), Noakhali-3814, Bangladesh

[2] Lecturer, Department of Management Information Systems, Noakhali Science and Technology University (NSTU), Noakhali-3814, Bangladesh

[3] Associate Professor, Department of Business Administration, Noakhali Science and Technology University (NSTU), Noakhali-3814, Bangladesh

[4] Assistant Professor, Department of Management Information Systems, Noakhali Science and Technology University (NSTU), Noakhali-3814, Bangladesh

Correspondence: Md. Al-Amin, Assistant Professor, Department of Management Information Systems, Noakhali Science and Technology University (NSTU), Noakhali-3814, Bangladesh.

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Abstract

The research project is mainly developed to emphasize the development of potential areas in Bangladesh especially in the islands where the tourism sector can be incorporated to act as an income generator alongside the traditional earning opportunities. To place our thoughts of this emerging sector in island areas, we had reviewed some of the works from the earlier researchers of different regions of the world worked on different islands' tourism developments. The result of our findings after examining those works by the researchers will provide us a clear understanding of how tourism can bring balance among environment, local community, and economy of the island areas of Bangladesh which can eventually ensure sustainability. There will be some recommendations as well as policies for enacting this new industry in the island areas in Bangladesh in the last section.

Keywords: Island tourism, impacts, Bangladesh tourism, development

1. Introduction

The development of a nation can't be at its peak until it ensures the sustainability of that situation. And the possibility of attaining such goals becomes easier for the authority when focusing on tertiary economy meaning service-based economy. Bangladesh a country with a huge potentiality to establish a service-based economy using its friendly and hospitable culture which eventually creates healthier consequences for Bangladesh in the world premises. From the economic point of view, the tourism industry alone responsible for becoming the world's biggest industry creating a wealth of 7.6 trillion U.S. dollars in 2016 through its direct, indirect, and induced involvement with different sectors such as accommodation, transportation, food, entertainment and attractions (Statista Research Department, 2018). The industry has reached to a certain stage of a nation's economy where the policymakers are considering this booming sector as an economy moving force in recent time and it can easily be measured through inspection of the generated value of 8.27 trillion U.S. dollars in 2017 worldwide (Statista Research Department, 2019). The nature of traveling and the facilities for travel have increased the tendency of frequent visits among the mass people all over the world. It has proved that the effect of any critical condition such as war, criminal activity directly affects this industry-first (Statista Research Department, 2019). The recent study of Global Data has shown that the Asian countries are becoming the choice of destination for developed nations' tourists because of the changing nature such as lower connectivity cost; easy visa policies, tourism amiable policymakers, and weak currencies allow tourists from all over the world to visit six cities out of ten in 2018 worldwide (Taylor, 2019). The diversified destinations and the improved promotional efforts by Asian countries are gradually attracting the attention of international tourists to visit different places in Asia. The discussion drives a pave for the tourism industry of Bangladesh to follow since the beautiful country has lots to share with the rest of the people of the world. Although Bangladesh is not doing its best in attracting foreign nationals, the nominal

growth of domestic tourists gives hope to the decision-makers to step forward and display the beauty of our motherland.

The travel pattern has changed among the domestic tourists of Bangladesh in recent times, leaving the traditional environment of crowded destinations through visiting the newly discovered beaches of island areas instead (Shihab, 2019). Bangladesh has its most of the beautiful islands with diversified beach areas along the side of the mighty Bay of Bengal and Padma River creating an amazing environment molded with the love of nature. The island in Bangladesh known as the "Char" or "Dwip" and the amazing islands are such as Saint Martin, Maheshkhali, Chera Dwip, Kutubdia, Nijhum Dwip, Sonadia, Manipura, Sandwip, Shahpuree, etc. (Travelmate, 2019). The global tourism pattern of seeking nature-based experience and true cultural interaction has opened up the door for the pacific island countries to establish tourism as one of the key drivers in changing economic progress through bringing financial security in employment and infrastructural movement (Everett, 2018).

The present decision of the governmental body has been showing the enlightenment in introducing island-based tourism in Bangladesh. Though the country is facing a poor number in attracting foreign tourists for a long time to visit our tourist destinations, the plans including the creation of special tourist zones taken by the authority providing options for the government as well as locals to gain enhancement in their economic bar. There are three projects are going on by the Bangladesh Economic Zone Authorities (BEZA) only in Cox's Bazar district named as Naf tourism park, Sabrang tourism park, and Sonadia eco-tourism park and it is predicted that the projects once completed will generate 2 billion U.S. dollars with the inclusion of two hundred thousand jobs (Siddiqi, 2019).

There are several islands in Bangladesh having unique characteristics that can easily draw the attention of the tourists as the booming market is always looking for places with a calm environment. Here the island areas have that kind of potentiality to deal with such demand. The factors which are involved in transforming the island into a destination for people to visit, we need to step forward to take the advantage from established research on island tourism and get a holistic understanding in setting the best strategies as well as focusing on the existing consequences from different perspectives of tourism stakeholders.

The study is basically operated to find out the necessity of island tourism development for a country like Bangladesh through focusing on the impacts of it on different stakeholders. The further section will reveal the area of investigation of this project.

2. Problem Identification

2.1 Study Area

The tourism industry has been playing a key role in most of the developing nations to place their economy in the growing parameter which eventually shows them the future doings and set the goals for economic solvency with a sustainable approach. The diversified needs and tastes of growing tourism markets in developed as well as in developing countries have recognized the island areas as a tourism product. The policymakers and the researchers have always been involved in finding out the long term solution for economic prosperity in the developing nations. A prior analysis by UNWTO, suggests that the Small Island Developing Countries can avail the tourism as a driver of development which can ensure employment opportunities for male and female of any skill group, empowerment of the community, bringing economic resilience, raising awareness for environment conservation, and lastly establishment blue economies assuring the enhanced investment in the tourism value chain (UNWTO, 2014). Bangladesh has discovered mainly the two coast based destinations Cox's Bazar and Saint Martin Island for tourism purposes. The main theme behind this study has remained confined in digging out the possibilities of establishing island-based tourism in Bangladesh and to reach the answer of it, the study has backed by the representation of impacts of the island based tourism.

2.2 Knowledge Scope

To find out the sustainable solution of traditional challenges for Bangladesh such as poverty, less coordination among linked industries and employment generation can be solved through the establishment of the tourism sector as an alternative sector for economic growth (Hasan et.al, 2013). The policymakers need to be aware of the potentiality of different areas where they can incorporate the development goal. The involvement of researchers in providing the information and notifying the development gap can be regarded as an influential factor for a new sector to grow. It is not impossible to achieve the goal of vision 2021 for Bangladesh if it can utilize this undiscovered industry through setting short, mid and long term projects and allocating enough budget for the execution (Parveen, 2013). To conduct the study, the authors have developed some of the questions which will ultimately direct the necessity of island-based tourism in Bangladesh.

The findings we will achieve after analyzing the answers to the first two questions eventually lead us to a conclusion where we can easily get an understanding of the number three question.

- What are the factors that influenced island-based tourism?
- What could be the impacts of island tourism on different stakeholders?
- Why does it essential to establish island-based tourism in Bangladesh?

3. Methodology

Though island-based tourism has already experienced in many countries and even today giving them the best benefit out of that industry. But Bangladesh has utilized a minimum level of coastal resources for promoting tourism in these aspects. So, the study basically involved in finding out the positive impacts of established writing through different authors' observations. To conduct the study, very few articles, websites, conference papers, internet columns were identified which meet the criteria of the study purposes. The researchers first gathered information from different sources about tourism prospects in the developing nations, island-based tourism development in developing countries, impacts of island-based tourism, the necessity of island-based tourism in those areas. Then, the information which was collected through journal articles, conference papers, and website writings categorized to find out the specific data regarding the study area. The categories were involved in finding impacts from different aspects such as economic, environmental, socio-cultural, and community. Another category was developed to approach the requirement for introducing the tourism industry in island areas. The following table 1 represents the examined resources used for attaining the understanding of "Assessing the Applicability of Tourism for Islands' People in Bangladesh: A qualitative View Based on Existing Literature".

Table 1. Resources used for this study

No	Author(s)	Year	Source Name	Title
1	Andaria, K.S., Marsoedi, Arfiati, D., Hakim, L. & Soemarno	2013	Journal of Basic and Applied Scientific Research	Stakeholder Analysis for Coastal Tourism Development in Bangka Island, North Sulawesi Indonesia.
2	Bojanic, D. C., Warnick, R. & Musante, M.	2009	2009 ttra International Conference.	An Evaluation of the Relative Importance of Tourism for Islands.
3	Briguglio, L. & Briguglio, M.	1996	Pinter	Sustainable Tourism in the Maltese Islands.
4	Britton, S.G.	1982	Annals of Tourism Research	The Political Economy of Tourism in the Third World.
5	Craigwell, R.	2007	www.eldis.org	The importance of the tourism industry in small island developing states.
6	Diedrich, A., & Aswani, S.	2016	Royal Swedish Academy of Sciences.	Exploring the potential impacts of tourism development on social and ecological change in the Solomon Islands.
7	Everett H., Simpson D. & Wayne, S.	2018	www.adb.org	Tourism in Pacific.
8	Hall, C.M.	2010	Asia Pacific Journal of Tourism Research	Island Destinations: A Natural Laboratory for Tourism: Introduction
9	Hassan, M. R., Ullah, M.M. & Chowdhury, M.S.A.	2013	World Journal of Social Sciences	Impact of Tourism in Bangladesh Economy.
10	Kennedy, R.	2018	Usatoday.com	The Effects of Tourism in the Caribbean
11	King, R.	1993	Routledge	The geographical fascination of islands.
12	Lockhart, D., Drakakis, S.D. & Schembri, J.	1993	Routledge	The development Process in Small Island states
13	Mitchell, R.E. & Reid, D.G.	2001	Annals of Tourism Research.	Community integration Island Tourism in Peru.
14	Muhlhausler, P. & Stratford, E.	1999		Speaking of Norfolk Island: from dystopia to utopia
15	Nabiha, A.K.S. & Saad, N.H.M.	2015	Problems and Perspectives in Management	Tourism planning and stakeholders' engagements: the case of Penang Island.
16	Parveen, J. A.	2013	Scientific Research Journal (SCIRJ)	Current Status of Tourism Industry in Bangladesh: An Empirical Evaluation
17	Seetanah, B.	2011	Annals of Tourism Research	ASSESSING THE DYNAMIC ECONOMIC IMPACT OF TOURISM FOR ISLAND ECONOMIES

18	Shihab, S.	2019	The financial express.com	Bangladesh's tourism: Prospects and lacunae
19	Siddiqi, R.	2019	Bangladeshmonitor.com	Three islands are set to enrich tourism attraction in BD.
20	Statista Research Department	2018	www.statista.com	Global tourism
21	Statista Research Department	2019	www.statista.com	Total international tourism receipts
22	Stone, L. & Stone T.M.	2011	Journal of Sustainable Tourism.	Community-based tourism enterprises: challenges and prospects for community participation: Khama Rhino Santuary Trust, Botswana.
23	Stylidis, D. & Terzidou, M.	2007	Middlesex University	ISLAND TOURISM AND ITS SOCIO-ECONOMIC IMPACTS
24	Su, M.M., Wall, G. & Wang, S.	2017	Island Studies Journal	Yujiale fishing tourism and island development in Changshan Archipelago, Changdao, China
25	Taylor, M.	2019	www.travelpulse.com	Asian tourism on the rise
26	Thetsane, R.M.	2019	Athens Journal of Tourism.	Local Community Participation in Tourism Development: The Case of Katse Villages in Lesotho.
27	Travelmate	2019	www.travelmate.com.	Top 15 islands in Bangladesh
28	UNWTO	2014	www.e-unwto.org	Tourism in Small Island Developing States (SIDS)

4. Theoretical Outline

4.1 Island Tourism

"Who does not love the islands? To be encircled by the ocean, lapped by the tide and concealed by palm trees and sandy outcrops of rocks and grass. How lovely! And to be safe behind the moat which separates us from our neighbors. Who doesn't feel helped by the security of an island home?" (Muhlhausler & Stratford, 1999).

From the early travelers to the present travel lovers, island areas are recognized for their natural attractions and giving people peace of mind when making a visit to those places. Island-based tourism generally regarded as one of the tourism destinations having less human-made facilities and availing an opportunity to meet nature for the visitors. Different researchers and academicians have provided their understanding of the explanation of the island tourism. From the perspective of a geographer named Marshall, for example, gives the definition of the island as: "and then there are the islands…many are microstates…vulnerable because of isolation that produces poverty and instability". On the other hand, the academician views it in a different way. An explanation for the island as follows "most enticing form of land. The Symbol of the interminable challenge among land and water… islands propose puzzle and experience; they move and commend" (King, 1993). Another definition has established the characteristics of the island areas said "'Their appeal may relate to the very real feeling of separateness and difference, caused in part by their being physically separate…and given people's desires for the difference while in pursuit of leisure, different climates, physical environments, and culture can all be expected to further the attractiveness of islands as tourism destinations' (Lockhart, 1993). So, the island area has the potentiality to serve different needs of the growing travel markets in spite of having a shortage of human-made facilities. Sometimes, the area of a certain destination which is shorter in size has an influential impact on the structure of tourism development of that destination (Stylidis and Terzidou, 2007).

Why do we need Island Tourism?

It has noticed that the tourism industry in recent times becomes a multi-billion industry in different countries and especially the developing nations accept this sector for their betterment in terms of economic solvency having insufficiency in the production because of minimum technological expertise (Bojanic et al., 2009). It is quite a common phenomenon for the island based countries also to rely on tourism for their foreign exchange and employment of their labor forces. That is why the tourism industry has evolved as one of the influential sectors in many islands globally and it has been replacing the production industries with services based economy (Craigwell, 2007). The inhabitants of the island areas are faced with some of the challenges for living in those places. The common problems are involved such as isolated areas, less population, smaller economy, insufficient communication, etc. One of the researchers said that "these environments are with their limited resource base, tiny domestic markets, and diseconomies of scale, poor accessibility, limited infrastructure and institutional

mechanisms, and a serious extent of reliance on outer powers (Britton, 1982). These consequences drive these areas to seek a solution and employ them in the development tide with the mainstream. Here, tourism can find a place to play the role of a catalyst to keep up their economic stability as well as ensure the sustainability of that development. Those countries having a developing status as well as enriched with a good number of small islands had experienced an increase in the number of tourist visits from 1998 to 2004 than the rest of the world (Craigwell, 2007). The present phenomena have also provided an opportunity to the undiscovered island areas to show themselves to the potential travelers. Bangladesh and its beautiful islands could be the targeted destinations for the growing market in Asia as well as worldwide if the promotion experience a right on the money situation. The economic growth of Bangladesh has set an option for its own people to experience more leisure time and island areas can be the next destination for the growing domestic tourist. The uniqueness of the destination as well as the services of that place generally represent the competitiveness of that particular place (UNWTO, 2014). The characteristics of the islands of our country place them to a point where they can ensure an advantageous situation in attracting visitors. The island areas which have already experienced the attention by the growing tourist numbers have distinctive characteristics and this situation will call for the specific necessities for the development, marketing, and promotion of those areas (Hall, 2010).

5. Impacts of Island Tourism Development

The small island areas having numerous problems do not allow them to enroll them in the global development progress because of isolation and the lack of enough facilities leaves their economies in the dark. The previous sections of our study have provided evidence about the essentiality of focusing on tourism development in island areas. This section will notify the impacts of such development from a different point of view of the island's society.

5.1 Economic Impact

The island areas most probably faced the fear of vulnerabilities because of the geographic characteristics of those places. Small island based developing countries (SIDC) has experienced a contribution for the development of tourism in ensuring economic resilience and it can be easily understandable through the enhancement of international tourist visit from 28 million in 2000 to 41 million in 2013 in small island developing countries(SIDC) responsible for 53 billion US dollars tourism export in 2013 (UNWTO, 2014). The tourism industry especially in the island areas of Malaysia has revealed that tourism works as an economic contributor in creating job opportunities for all types of people lived in those island areas and lifting their way of living also (Nabiha and Saad, 2015). Many Countries having island-based tourism have been earning a great amount of the economic portions from this industry. A study of panel data from 19 island economies from 1990 to 2007, suggests that the increasing number of tourists in the island areas expand private investment for the tourism infrastructure as well as the foreign direct investment can find these places as investment-friendly zones which ultimately propel the development of tourism industry alongside other social elements (Seetanah, 2011). Taking the example of the Caribbean island destinations, in 2013 the total GDP of that region is contributed by 14 percent from the tourism sector stating as high as 80 cents in every dollar income (Kennedy, 2018).

5.2 Socio-Cultural Impact

The geographical formation of every island is different from one another creating unique characteristics for them. The way of living of the people in the island areas is also influenced by those characteristics. On the other hand, the cultural components of these areas reveals the behavior of that society. The local products produced in those islands areas which was only consumed by the locals once can easily get the new market because of tourism introduction transferring the food habits to the visitors whereas bringing a positive change in producing local products more (Kennedy, 2018). The discovery of tourism activities in the island areas also contributes in influencing people of those areas to refocus on the production of local crafts, and then the improvement in communication system, educational institutions, medical services and other facilities of those places ensure broader outlook of the islanders (Briguglio and Briguglio, 1996). The social point of view for island tourism development has provided evidence on the influence of tourism on the local community's behavior and their social structure (Andaria et al., 2013). The small islands in China have established an evidence for the other island based destinations as they earn money through sharing their fishing cultures as well as the products produced by the locals transfer an idea of impact of tourism development on the physical and social structure of the island communities (Su et al., 2017). It is found that the tourism industry will impact the life of the local people in some way whether the level of exposure of the local culture which actually demand for enacting majority of the people with the direct economic activities (Diedrich and Aswani, 2016).

5.3 Community Impact

Community integration plays a pivotal role in introducing a new sector that actually influences the traditional way of living as well as creates an impact on each elements of that society. Island tourism is also responsible for bringing changes within the community's cultures as well as their economic wellbeing. Tourism development ensures both the economic benefits through providing better jobs for all types of people from unskilled to skilled as well as venturing facilities for the local people to generate income for them, whereas the improvements in service facilities for tourists will indirectly facilitate the local people in upgrading their standard of living (Mitchell and Reid, 2001). The involvement of the local community of a destination is a prerequisite for the sustainability of that place. Tourism in the island areas helps the community to build a relationship with mainstream people which can create opportunities for them to avail of new facilities for their betterment whether it is a physical need or a self-esteem one. The employment opportunities for the locals in the island areas are basically confined within the fishing and agriculture. Here, this industry can create an opportunity for the local community to broaden its income-generating option. The benefits derive from tourism can ensure community betterment whereas the involvement of the community can help in minimizing negative impacts that can be originated through tourism activities (Thetsane, 2019). The society in such type of environment can avail the opportunity to provide their women job facilities allowing them to participate in the development journey and this scenario has drawn the attention in the Caribbean where only the hotel and restaurant sector provide around 43% to 63% jobs (UNWTO, 2014). In order to ensure the benefits of the community, they should have to engage themselves in the management, decision making, and tourist management activities (Stone and Stone, 2011).

5.4 Environmental Impact

In most countries, the governmental body as the authority of the state is now looking for such growth strategy which can ensure viability as well as sustainability at the same time. To achieve such objective tourism can be evolved as an essential tool for the policymakers. In the island areas which are basically regarded as a vulnerable place where the concentration is given at a certain level so that the development process can contribute to that place for a long time. Island tourism is one kind of responsible tourism in a sense where it considers all the available stakeholders and measures the impact of each component during the development process. The blue economy and the growth of this sector can be obtained through the establishment of island tourism where presenting natural resources and services can be used to generate income while ensuring the protection of the environment with the improved financial status of those regions (UNWTO, 2014). The development of tourism in the ocean area ensures the investment in green economies which can be attained through establishing eco-friendly facilities. And this development planning is far better than any other production process establishment in the island areas. The challenges in climate issues can also be addressed through the promotion of nature-based travel experience rather than places where most of the facilities demanded huge infrastructural requirements. Though most of the studies have shown the impact of tourism on the environment mainly negative. But the use of island areas for tourism expansion as an example, it increases the awareness of conservation of the natural resources to ensure the sustainability of the destinations.

6. Recommendations

The early developments of tourism in island areas that have presented in different works of researchers find out the shortages and discrepancies in terms of smooth operation. Another thing which is important for all the stakeholders to ensure benefits through tourism activities in island areas. The followings are basic recommendations that have been given on the basis of the observation of tourism developments in various island areas:

- The authority should have to establish a dedicated department within the government to run the development programs in island areas.
- To educate about the industry and the conservation of the environment in those vulnerable areas, NGOs should have to coordinate with the regional authority.
- The participation of the community should have to be ensured from the planning to the decision making process.
- The public and private coordination should have to be bought to ensure the infrastructural development of island areas.
- There should have to be some programs for living during the offseason for the islanders.
- Governmental supports should have to be ensured for the islanders to commence their own ventures.

Apart from these, there will be certain situations where the decision-making process must have to go through a participatory environment. And this will eventually ensures the benefits of the ultimate objectives of different stakeholders.

7. Conclusion

The current study tried to present the ideas of island tourism and it has also revealed the impacts on different stakeholders. Though tourism is not that much booming in our country especially the international tourists. So, this study has opened up an option for the policymakers as well as the researchers to conduct empirical studies to see the exact situation on the field to project tourism development through islands. To investigate the idea of island tourism, we mostly focused on those island destinations which have already experienced a good receipt from their activities. And this study tried to specify the changes that may happen in the future if this industry opens up. The review of all the established literature on this topic remains impossible and many of them could not meet the criteria of the researcher's interest in observation. The development of island tourism in different areas and their returns can be measured in further study to ensure the applicability of such industry for places having the same potentiality.

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Evidence From Data Analysis, Fifteen Developed Countries and the United States Home Prices Increase Between 1990 to 2006 Result of Advancement In Technology, Worldwide Economic Collapse and Great Recession Result of False Information by Media and Economic Policy Failures: Walters Real Estate Bubble Impossibility Price Transparency Theory, Real Estate Bubble Is Impossible, An End to Economic Policies Based on False Information

Eddison T. Walters[1]

[1] Walters Global Business Resources LLC, United States

Correspondence: Dr. Eddison T. Walters, Walters Global Business Resources LLC, 170 NE 2nd Street #4065 Boca Raton, FL 33429, United States.

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Abstract

Based on the findings of the current study, policymakers must take a hard look at the media and themselves, because the world can no longer blame the subprime mortgage industry for causing the Global Financial Crisis of 2007 and 2008. The public must demand answers from the media and policymakers explaining how an economic crisis that could have been avoided resulted in the collapse of the global economy. The lack of evidence supporting the theory of a financial bubble and a real estate bubble called for further investigation of factors leading to the Global Financial Crisis of 2007 and 2008. Evidence presented from data analysis in Walters (2018) suggested no financial bubble existed in developed or developing countries around the world, preceding the Global Financial Crisis of 2007 and 2008. Based on data analysis in Walters (2018) the evidence also suggested, the lasting effect of economic policies in response to the Global Financial Crisis of 2007 and 2008 for both developed and developing countries around the world, had no significant impact on the financial sector but pointed to a lack of economic growth. The findings raised significant questions about the existence of a real estate bubble in both developed and developing countries. Evidence from data analysis presented in Walters and Djokic (2019) suggested the existence of a real estate bubble in the United States real estate market preceding the Global Financial Crisis of 2007 and 2008 was a false conclusion. Data analysis in Walters (2019) resulted in, 0.989 Adjusted R-square, 194.041 Mean Dependent Variable, 5.908 Square Error of Regression, 488.726 Sum-of- Square Residual, and 0.00000 Probability (F-statistic), for correlation between the independent variable representing advancement in technology, and the dependent variable representing home purchase price in the United States preceding the Global Financial Crisis of 2007 and 2008. The findings in Walters (2019) concluded the rapid increase in home purchase price in the United States real estate market, was due to increased demand for homes from the adaptation of advancement in technology in the real estate and mortgage industries. The current study expanded the investigation of the growth in home purchase price to fifteen developed countries around the world, building on the findings of previous research by the current researcher. The researcher in the current study concluded, the existence of significant and near-perfect correlation in many cases, between the dependent variable representing growth in home purchase price, and the independent variable representing advancement in technology. The analysis was based on data analyzed from fifteen developed countries around the world, which was collected between 1990 and 2006. The data analysis included home purchase price data from, Canada, United Kingdom, Denmark, Finland, France, Italy, New Zealand, Sweden, Netherlands, Australia, Ireland, Belgium, Norway, Spain, and Portugal. Data preceding the Global Financial

Crisis of 2007 and 2008 were analyzed in the current study. The researcher in the current study concluded the existence of overwhelming evidence suggesting advancement in technology was responsible for the rapid increase in home prices in developed countries around the world preceding the Global Financial Crisis of 2007 and 2008. The result of data analysis in the current study provided further confirmation of the accuracy of former Federal Reserve Board Chairmen, Alan Greenspan and Ben Bernanke 2005 assessment which concluded, the occurrence of a real estate bubble developing was impossible due to the Efficient Market Hypothesis, before reversing course subsequent their assertion in 2005 (Belke & Wiedmann, 2005; Starr,2012). The result of the current study provided additional evidence supporting Eddison Walters Risk Expectation Theory of The Global Financial Crisis of 2007 and 2008. The result from data analysis also confirmed the need for the adaptation of Eddison Walters Modern Economic Analysis Theory. As a result of the findings in the current study, the researcher concluded the development of a real estate bubble is impossible where there exists real estate price transparency, as is the case in most developed and developing countries. The researcher presented Walters Real Estate Bubble Impossibility Price Transparency Theory based on the findings. False information of a real estate bubble and predictions of a real estate crash disseminated through the mainstream media and social media can be a destructive force with a disastrous effect on the economy around the world. The failure by the media to hold themselves and policymakers to a higher standard resulted in the Global Financial Crisis of 2007 and 2008. The result of the failure by the media was a worldwide economic crisis and the Great Recession that followed the Global Financial Crisis of 2007 and 2008. Lessons learned from the Global Financial Crisis of 2007 and 2008 can assist in preventing another economic crisis in the future.

Keywords: global financial crisis of 2007 and 2008, Walters real estate bubble impossibility price transparency theory, Walters and Djokic quantitative analysis factor distortion theory, Eddison Walters modern economic analysis theory, Eddison Walters risk expectation theory of the global financial crisis of 2007 and 2008, real estate bubble, advancement in Technology

1. Introduction

Based on the findings of the current study, policymakers must take a hard look at the media and themselves, because the world can no longer blame the subprime mortgage industry for causing the Global Financial Crisis of 2007 and 2008. The public must demand answers from the media and policymakers explaining how an economic crisis that could have been avoided resulted in the collapse of the global economy.

The lack of evidence in the literature supporting the theory of a financial bubble and the theory of a real estate bubble called for further investigation of factors leading to the Global Financial Crisis of 2007 and 2008. Evidence presented from data analysis in Walters (2018) suggested no financial bubble existed in developed or developing countries around the world, preceding the Global Financial Crisis of 2007 and 2008. Based on data analysis in Walters (2018) the evidence also suggested, the lasting effect of economic policies in response to the Global Financial Crisis of 2007 and 2008 for both developed and developing countries around the world, had no significant impact on the financial sector but pointed to a lack of economic growth. The findings raised significant questions about the existence of a real estate bubble in both developed and developing countries. Evidence from data analysis presented in Walters and Djokic (2019) suggested the existence of a real estate bubble in the United States real estate market preceding the Global Financial Crisis of 2007 and 2008 was a false conclusion. Data analysis in Walters (2019) resulted in, 0.989 Adjusted R-square, 194.041 Mean Dependent Variable, 5.908 Square Error of Regression, and 488.726 Sum-of- Square Residual for correlation between the independent variable representing advancement in technology, and the dependent variable representing home purchase price in the United States preceding the Global Financial Crisis of 2007 and 2008.

The current study expanded the investigation of the growth in home prices to fifteen developed countries around the world. Data suggested the existence of a significant near-perfect correlation in many cases, between the dependent variable representing growth in home price and the independent variable representing advancement in technology based on data analyzed from fifteen developed countries that were collected from 1990 to 2006. Data from the Organization for Economic Cooperation and Development (OECD) database which included, Canada, United Kingdom, Denmark, Finland, France, Italy, New Zealand, Sweden, Netherlands, Australia, Ireland, Belgium, Norway, Spain, and Portugal, preceding the Global Financial Crisis of 2007 and 2008 was analyzed in

the current study.

The researcher in the current study concluded the existence of significant evidence suggesting advancement in technology was responsible for the rapid increase in home prices around the world preceding the Global Financial Crisis of 2007 and 2008. The result of the current study provided further confirmation of Eddison Walters Risk Expectation Theory of The Global Financial Crisis of 2007 and 2008, and the need for the adaptation of Eddison Walters Modern Economic Analysis Theory.

2. Background of Study

The motivation for the current study resulted from an investigation into the lack of evidence supporting the existence of a real estate bubble preceding the Global Financial Crisis of 2007 and 2008 in the literature, despite widespread acceptance of the theory of a real estate bubble preceding the financial crisis by researchers around the world. Eddison Walters Risk Expectation Theory of The Global Financial Crisis of 2007 and 2008 presented an alternative explanation of the true nature of the Global Financial Crisis of 2007 and 2008. The explanation ruled out the existence of a real estate bubble preceding the Global Financial Crisis of 2007 and 2008. The theory explained the increase in home purchase price resulting from the rapid adaptation of technology in both the mortgage industry and the real estate industry from 1995 to 1999. The theory pointed to false information from the media as a significant factor causing the financial crisis. An abundance of media coverage of the false theory of a real estate bubble, which was widely accepted without evidence supporting the claim, along with predictions of a real estate market crash, significantly increased risk expectation levels in the financial market. Evidence suggested an irrational reaction by the financial market resulting from fairs that mortgage-backed securities were worthless. Significant risk expectation in the financial market triggered the events leading to the Global Financial Crisis of 2007 and 2008. The findings of several studies by the current researcher assisted in the development of Eddison Walters Modern Economic Analysis Theory. The goal of the theory is to prevent future errors, such as the error falsely concluding the existence of a real estate bubble leading to the Global Financial Crisis.

3. Statement of the Problem

Evidence in previous studies by the current researcher suggested, no real estate bubble existed in the United States real estate market preceding the Global Financial Crisis of 2007 and 2008. The evidence also suggested technology was responsible for the increased demand that led to home purchase price increase. The false conclusion of the existence of a real estate bubble in many countries around the world, continue to be an area of significant concern by the current researcher today. As a result of the problem, the researcher conducted the current study that analyzed data in the real estate market of fifteen developed countries around the world, expanding the research on the United States real estate market in previous studies. Gaining an understanding of the nature of the growth of home purchase prices in the real estate market of fifteen additional developed countries, during the same period of previous studies, is critical research that will contribute to the literature. The study will significantly contribute to the understanding of the impact of advancement in technology on real estate markets around the world. The study will also significantly contribute to the understanding of the Global Financial Crisis of 2007 and 2008 and the existence of real estate bubbles. The information gained from the study can help avoid another financial crisis in the future.

4. Purpose of the Study

The current study focused on gaining an understanding of the impact of technology on real estate markets of developed countries around the world. The goal of the current study was to gain an understanding of the true nature of home purchase price increase around the world, to determine the likely existence of real estate bubbles in developed countries around the world during the period preceding the Global Financial Crisis of 2007 and 2008. A focus of the current study was also to settle questions associated with the possibility of the occurrence of widespread real estate bubbles in countries around the world.

Research Questions

1. Did the data suggest the existence of a real estate bubble in developed countries around the world preceding the Global Financial Crisis of 2007 and 2008?
2. Did the adaptation of technology in the mortgage industry and real estate industry in developed countries around the world lead to a significant increase in home purchase price preceding the Global Financial Crisis of 2007 and 2008?

Hypothesis

Ho1: The evidence from data analysis suggested, a real estate bubble did not exist in developed countries preceding the Global Financial Crisis of 2007 and 2008.

Ha1: The evidence from data analysis suggested, a real estate bubble did exist in developed countries preceding the Global Financial Crisis of 2007 and 2008.

Ho2: The evidence from data analysis suggested, technology did not lead to a significant increase in home purchase price in developed countries preceding the Global Financial Crisis of 2007 and 2008.

Ha2: The evidence from data analysis suggested, technology did lead to a significant increase in home purchase price in developed countries preceding the Global Financial Crisis of 2007 and 2008.

Nature of Study and Scope

The current research was a quantitative study using secondary data. Mobile cellular subscriptions (per 100 people) in the United States from the World Bank Database, representing advancement in technology, and OECD House Price Index Database, representing growth in home purchase price was analyzed from 1990 to 2006 to gain an understanding of the correlation between the variables that were analyzed preceding the Global Financial Crisis of 2007 and 2008.

Limitations

Data analysis in the current study focused on explaining the correlation between the independent variable representing advancement in technology and the dependent variable representing growth in home purchase price of developed countries around the world preceding the Global Financial Crisis of 2007 and 2008. Conclusions were drawn on the existence of a real estate bubble in developed countries around the world preceding the Global Financial Crisis of 2007 and 2008, based on data analysis.

5. Literature Review

Several questions were raised by the current researcher, resulting from an investigation into the Global Financial Crisis of 2007 and 2008 in Walters (2018), which called for further investigation. The researcher in the current study developed the Eddison Walters Risk expectation Theory of The Global Financial Crisis of 2007 and 2008 as an alternative to the account of the Global Financial Crisis of 2007 and 2008 found widely throughout the literature. The theory was developed based on the result of data analysis in Walters (2018). The result of evidence from data analysis in the study found a lack of evidence supporting the existence of a financial bubble in the United States preceding the Global Financial Crisis of 2007 and 2008. The result of Walters (2018) called into question the entire account of the Global Financial Crisis of 2007 and 2008 in the literature, prompting further investigation by the current researcher.

Additional studies conducted in Walters and Djokic (2019); and Walters (2019) continued the development of Eddison Walters Risk Expectation Theory of The Global Financial Crisis of 2007 and 2008. Based on data

analysis in Walters and Djokic (2019), the researchers concluded, the existence of a real estate bubble preceding the Global Financial Crisis of 2007 and 2008 was a false conclusion. Data analysis in Walters (2019) resulted in an Adjusted R-squared of 0.989 for correlation between the independent variable representing advancement in technology, and the dependent variable representing home purchase price. The result of data analysis provided overwhelming evidence; rapid growth in home purchase price in the United States between 1990 and 2006 was the result of the adaptation of technology by the real estate and the mortgage industries. Subprime mortgages and low-interest rates were ruled out as significant factors contributing to the cause of the Global Financial Crisis of 2007 and 2008 in both studies (Walters & Djokic, 2019; Walters, 2019). The studies confirmed, Eddison Walters Risk Expectation Theory of the Global Financial Crisis of 2007 and 2008 presented an accurate account for the cause of the Global Financial Crisis of 2007 and 2008. The study also confirmed the need to update the literature to accurately reflect the true nature of the Global Financial Crisis of 2007 and 2008.

Walters (2020B) presented further evidence supporting the Eddison Walters Risk Expectation Theory of The Global Financial Crisis of 2007 and 2008. Walters (2020B) highlighted the rapid adaptation of technology between 1995 and 1999 by the real estate industry discussed in Muhanna, (2000) and by the mortgage industry discussed in Straka (2000), leading to an exponential increase in the number of qualified homebuyers. The result of the significant increase in qualified homebuyers caused a significant increase in the demand for homes (Muhanna, 2000; Straka, 2000). The increase in demand led to a rapid increase in home prices (Walters, 2020B).

Other key factors leading to the Global Financial Crisis of 2007 and 2008 highlighted in Walters 2020B, were the sensationalized media coverage of false claims of a real estate bubble by economists and predictions of a real estate crash, with no evidence presented supporting the false claims. Data analysis in Walters (2020B) presented evidence of record-low mortgage delinquencies during four quarters of 2006 preceding the start of the financial crisis, at the same time economists predicted doom and gloom for the United States housing market.

Walters (2020B) highlighted critical economic policy failures by the U.S. Administration leading to further economic deterioration resulting from the failure to restart mortgage lending. Changes to the Troubled Asset Relief Program (TARP) from the inception of the program were critical errors by U.S. policymakers highlighted in the study (Walters 2020B). The economic policy failures by the U.S. Administration resulted in an acceleration of mortgage foreclosures and almost a complete shutdown in the United States construction industry due to the lack of mortgage lending. The shutdown occurred just as the housing industry in the United States was experiencing a significant increase in demand. The significant increase in demand was due to a significant increase in the number of qualified homebuyers, resulting from the adaptation of online listings, online mortgage applications, and automated mortgage underwriting (Walters, 2020B). The adaptation of Dodd-Frank legislation one year and a half subsequent the changes to TARP, further restricted mortgage lending, at a time when mortgage lending was the most critical challenge facing the United States housing sector. The adaptation of Dodd-Frank legislation was another catastrophic error by U.S. policymakers highlighted in Walters (2020B).

Hyatt (2020) conducted research analyzing data from sixty FDIC publicly traded banks in the United States. The study analyzed data between 2004 to 2013, including several years preceding the Global Financial Crisis of 2007 and 2008, and several years after the financial crisis. The study analyzed data from a sample of thirty banks that received TARP assistance, and thirty banks that did not receive TARP assistance. The findings of data analysis revealed no significant difference between the debt-to-equity ratio for banks receiving TARP assistance and banks that did not receive TARP assistance. As a result of data analysis, the researcher concluded TARP policy implementation by the U.S. policymakers was highly ineffective (Hyatt, 2020).

Walters Modern Economic Analysis Theory was developed in Walters (2020) and confirmed in Walters (2020C). Walters (2020) presented findings from data analysis of correlation between advancement in technology and the rapid growth in home purchase price in the United States preceding the Global Financial Crisis of 2007 and 2008, making the case for the development of Eddison Walters Modern Economic Analysis Theory. Walters (2020C) analyzed data resulting in 0.996 Adjusted R-square, 1512.683 Mean Dependent Variable, 36.399 Square Error of Regression, and 18548.89 Sum-of-Square Residual, 0.000000 F-statistic for correlation between the independent variable representing advancement in technology and the dependent variable representing the increase in consumer debt in the United States preceding the Global Financial Crisis of 2007 and 2008. The researcher concluded advancement in technology was responsible for the rapid growth in consumer debt preceding the

Global Financial Crisis of 2007 and 2008.

Eddison Walters Modern Economic Analysis Theory called for the consideration of advancement in technology as a factor when analyzing economic data for an extended period. The goal of the theory is to avoid errors from data distortion due to changes from technology (Walters, 2020; Walters, 2020C).

Data distortion from analysis that failed to consider the impact of technology on data was a critical error leading to the false conclusion of a real estate bubble. The error was determined to be a major factor leading to the Global Financial Crisis of 2007 and 2008 (Walters, 2020; Walters, 2020B; Walters, 2020C).

The sharing of information was the main function in the development of the firm (Kahai, Sara & Kahai, 2011). The firm is the building block of the economy. Understanding the impact of technology that significantly changes the way information is shared is a critical element of analyzing data over extended periods (Walters, 2020; Walters 2020C). Walters (2020C) presented evidence from data analysis, that revealed the growth in consumer debt preceding the Global Financial Crisis of 2007 and 2008 was the result of advancement in technology. The study further confirmed the need to adapt Eddison Walters Modern Economic Analysis Theory when analyzing data over an extended period Walters (2020C).

Agarwal and Bayus (2002) discussed the effect of product innovation on market demand. The literature suggested the result of innovation is a significant increase in demand that shifts the demand curve (Agarwal & Bayus. 2002). In the case of the real estate industry and mortgage lending industry for developed countries, the industries experienced a shift in the demand curve from the significant increase in demand from advancement in technology innovations. The move to online listings and online mortgage applications, along with automated underwriting resulting from technology innovations, significantly altered both industries. The current study noted, changes were critical factors resulting in significant home purchase price increase for developed countries.

Literature noted the critical nature of real estate market transparency, in developing real estate market stability. Chen and Hobbs (2003) conducted research that focused on measuring and explaining the global real estate market risk. The study noted increased market transparency resulted in greater real estate price certainty. The study noted market transparency was a critical factor in the assessment of real estate market risk (Chen & Hobbs, 2003). Gholipour, Tajaddini, and Pham, (2020) considered the mortgage default rate based on the level of real estate price transparency for a sample of 46 countries between 2006 and 2016. Data analysis found a significant negative relationship between real estate market transparency and mortgage default rate (Gholipour et. Al, 2020). In highly transparent real estate markets, real estate price distortion is very unlikely to occur due to the transparency of real estate prices.

The literature review highlighted key elements critical to understanding the true nature of the Global Financial Crisis of 2007 and 2008 and the worldwide economic crisis that lasted for an extended period after 2008. Recent studies raised significant questions regarding the accuracy of the cause of the Global Financial Crisis of 2007 and 2008 in the literature, as the investigation focused on uncovering the truth about the financial crisis. The understanding of the effectiveness of TARP, the effect of innovation on demand, and the level of real estate price transparency that exist in developed countries are critical to understanding the true nature of the Global Financial Crisis of 2007 and 2008 and the worldwide economic crisis that lasted for several years following.

6. Methodology

The researcher discussed the methodology, identified the population and sample for the research. Sampling procedures, data analysis plan of action, threats to validity, and ethical procedures were also included in the methodology section. The researcher concluded with a summary.

Research Questions

1. Did the data suggest the existence of a real estate bubble in developed countries around the world preceding the Global Financial Crisis of 2007 and 2008?
2. Did the adaptation of technology in the mortgage industry and real estate industry in developed countries

around the world lead to a significant increase in home purchase price preceding the Global Financial Crisis of 2007 and 2008?

Hypothesis

Ho1: The evidence from data analysis suggested, a real estate bubble did not exist in developed countries preceding the Global Financial Crisis of 2007 and 2008.

Ha1: The evidence from data analysis suggested, a real estate bubble did exist in developed countries preceding the Global Financial Crisis of 2007 and 2008.

Ho2: The evidence from data analysis suggested, technology did not lead to a significant increase in home purchase price in developed countries preceding the Global Financial Crisis of 2007 and 2008.

Ha2: The evidence from data analysis suggested, technology did lead to a significant increase in home purchase price in developed countries preceding the Global Financial Crisis of 2007 and 2008.

Population

Cellular phone subscription data from the United States was collected. House Price Index data was collected from the developed countries including, Canada, the United Kingdom, Denmark, Finland, France, Italy, New Zealand, Sweden, Netherlands, Australia, Ireland, Belgium, Norway, Spain, and Portugal.

Sampling and Sampling Procedures

Two variables were analyzed in the study. Cellular phone subscription data per one hundred in the United States collected from the World Bank Database was analyzed in the study. House Price Index collected from the OECD House Price Index Database on fifteen developed countries around the world was also analyzed in the study. Secondary data from the databases were collected from 1990 to 2006 for the study.

Threats to Validity

The validity of the data was established in the literature. The World Bank Database and the OECD House Price Index Database were established as reliable sources for secondary data in the literature. Cellular phone subscription per 100 in the United States was used as the measurement of advancement in technology to maintain a similar standard for comparing the results and drawing conclusions from the previous measurement of advancement in technology used by the researcher. Advancement in technology has been deployed at a similar rate across developing countries, therefore the researcher anticipated no bias in the data analysis from using the standard established by maintaining advancement in technology across the fifteen developed countries in the study and the United States. Data analyzed in the study was collected preceding 2007 to avoid the data being significantly skewed from government intervention policies and the turmoil in the financial market. The researcher collected data preceding 2007 as was the case in previous research that established the Eddison Walters Risk Expectation Theory and Eddison Walters Modern Economic Analysis Theory.

Ethical Procedures

Secondary data from the OECD House Price Index Database and the World Bank Database were existing databases, therefore no human subjects were involved in the research.

7. Results and Discussion

Data Analysis Results

Table 1. Developed countries correlation between the dependent variable Growth in Home and the independent variable Advancement in Technology 1990 to 2006 Purchase Price

CANADA	R-squared	Adjusted R-squared	S.E. of regression	Sum squared resid
	0.969617	0.967592	1.54058	35.60082
Log likelihood	Mean dependent var	S.D. dependent var	F-statistic	Prob(F-statistic)
-30.40477	42.46404	8.557719	478.7048	0
UNITED KINGDOM	R-squared	Adjusted R-squared	S.E. of regression	Sum squared resid
	0.984622	0.983596	2.557674	98.12541
Log likelihood	Mean dependent var	S.D. dependent var	F-statistic	Prob(F-statistic)
-39.02274	44.84753	19.9698	960.3879	0
DENMARK	R-squared	Adjusted R-squared	S.E. of regression	Sum squared resid
	0.941057	0.937127	5.112075	391.9996
Log likelihood	Mean dependent var	S.D. dependent var	F-statistic	Prob(F-statistic)
-50.79536	52.05692	20.38763	239.4833	0

The findings nonlinear correlation analysis between the dependent variable, Growth in Home Purchase Price and the independent variable, Advancement in Technology from 1990 to 2006 for the country of Canada in Findings Number 1 resulted in, 0.968 Adjusted R-square, 42.464 Mean Dependent Variable, 1.540 Square Error of Regression, 35.601 Sum-of-Square Residual, and 478.705 F-statistic, 0.000000 Probability (F-statistic). The findings nonlinear regression analysis in Findings Number 1 resulted in a significant correlation between the growth in the independent variable of mobile cellular subscriptions (per 100 people) data, and the growth pattern of the dependent variable of home purchase price for the country of Canada preceding the Global Financial Crisis of 2007 and 2008. Correlation of variables in the case of Canada resulted in a near-perfect correlation between the variables, which is very significant therefore the researcher concluded, no real estate bubble existed in Canada real estate market preceding the Global Financial Crisis of 2007 and 2008.

The findings nonlinear correlation analysis between the dependent variable, Growth in Home Purchase Price and the independent variable, Advancement in Technology from 1990 to 2006 for the country of the United Kingdom in *Findings Number 2* resulted in, 0.984 Adjusted R-square, 44.848 Mean Dependent Variable, 2.558 Square Error of Regression, 98.125 Sum-of-Square Residual, 906.388 F-statistic, 0.000000 Probability (F-statistic). The findings nonlinear regression analysis in *Findings Number 2* resulted in a significant correlation between the growth in the independent variable of mobile cellular subscriptions (per 100 people) data, and the growth pattern of the dependent variable of home purchase price for the country of United Kingdom preceding the Global Financial Crisis of 2007 and 2008. Correlation of variables in the case of the United Kingdom resulted in a near-perfect correlation between the variables, which is very significant therefore the researched concluded no real estate bubble existed in the United Kingdom real estate market preceding the Global Financial Crisis of 2007 and 2008.

The findings nonlinear regression analysis in Findings Number 3 resulted in a significant correlation between the growth in the independent variable of mobile cellular subscriptions (per 100 people) data, and the growth pattern of the dependent variable of home purchase price for the country of Denmark preceding the Global Financial

Crisis of 2007 and 2008. Correlation of variables in the case of Denmark resulted in a near-perfect correlation between the variables, which is very significant therefore the researched concluded no real estate bubble existed in Denmark real estate market preceding the Global Financial Crisis of 2007 and 2008.

The findings nonlinear correlation analysis between the dependent variable, Growth in Home Purchase Price and the independent variable, Advancement in Technology from 1990 to 2006 for the country of Denmark in Findings Number 3 resulted in, 0.937 Adjusted R-square, 52.057 Mean Dependent Variable, 5.112 Square Error of Regression, 239.483Sum-of-Square Residual, and 165.068 F-statistic. 0.000000 Probability (F-statistic).

Table 2. Developed countries correlation between the dependent variable Growth in Home and the independent variable Advancement in Technology 1990 to 2006 Purchase Price

FINLAND	**R-squared**	**Adjusted R-squared**	**S.E. of regression**	**Sum squared resid**
	0.858039	0.848575	5.029483	379.4355
Log likelihood	**Mean dependent var**	**S.D. dependent var**	**F-statistic**	**Prob(F-statistic)**
-50.51846	55.37701	12.92481	90.66276	0
FRANCE	**R-squared**	**Adjusted R-squared**	**S.E. of regression**	**Sum squared resid**
	0.957166	0.954311	3.568787	191.0436
Log likelihood	**Mean dependent var**	**S.D. dependent var**	**F-statistic**	**Prob(F-statistic)**
-44.68591	53.65196	16.696	335.19	0
ITALY	**R-squared**	**Adjusted R-squared**	**S.E. of regression**	**Sum squared resid**
	0.955966	0.953031	3.934644	232.2213
Log likelihood	**Mean dependent var**	**S.D. dependent var**	**F-statistic**	**Prob(F-statistic)**
-46.34501	74.95548	18.15512	325.6493	0

The findings nonlinear correlation analysis between the dependent variable, Growth in Home Purchase Price and the independent variable, Advancement in Technology from 1990 to 2006 for the country of Finland in Findings Number 4 resulted in, 0.849 Adjusted R-square, 55.377 Mean Dependent Variable, 5.029 Square Error of Regression, 379.436 Sum-of-Square Residual, and 90.663 F-statistic, 0.000000 Probability (F-statistic).

The findings nonlinear regression analysis in Findings Number 4 resulted in a significant correlation between the growth in the independent variable of mobile cellular subscriptions (per 100 people) data, and the growth pattern of the dependent variable of home purchase price for the country of Finland preceding the Global Financial Crisis of 2007 and 2008. Correlation of variables in the case of Finland resulted in a very strong correlation between the variables, which is very significant therefore the researched concluded no real estate bubble existed in Finland real estate market preceding the Global Financial Crisis of 2007 and 2008.

The findings nonlinear correlation analysis between the dependent variable, Growth in Home Purchase Price and the independent variable, Advancement in Technology from 1990 to 2006 for the country of France in Findings Number 5 resulted in, 0.954 Adjusted R-square, 53.652 Mean Dependent Variable, 3.569 Square Error of Regression, 191.044 Sum-of-Square Residual, 335.190 F-statistic, 0.000000 Probability (F-statistic). The findings nonlinear regression analysis in Findings Number 5 resulted in a significant correlation between the growth in the independent variable of mobile cellular subscriptions (per 100 people) data, and the growth pattern of the dependent variable of home purchase price for the country of France preceding the Global Financial Crisis of 2007 and 2008. Correlation of variables in the case of France resulted in a very strong. correlation between the variables, which is very significant therefore the researched concluded no real estate bubble existed in France real estate market preceding the Global Financial Crisis of 2007 and 2008.

The findings nonlinear correlation analysis between the dependent variable, Growth in Home Purchase Price and the independent variable, Advancement in Technology from 1990 to 2006 for the country of Italy in Findings Number 6 resulted in, 0.953 Adjusted R-square, 74.995 Mean Dependent Variable, 3.935 Square Error of Regression, 232.221 Sum-of-Square Residual, 325.649 F-statistic, 0.000000 Probability (F-statistic). The findings nonlinear regression analysis in Findings Number 6 resulted in a significant correlation between the growth in the independent variable of mobile cellular subscriptions (per 100 people) data, and the growth pattern of the dependent variable of home purchase price for the country of Italy preceding the Global Financial Crisis

of 2007 and 2008. Correlation of variables in the case of Italy resulted in a near-perfect correlation between the variables, which is very significant therefore the researcher concluded, no real estate bubble existed in Italy real estate market preceding the Global Financial Crisis of 2007 and 2008.

Table 3. Developed countries correlation between the dependent variable Growth in Home and the independent variable Advancement in Technology 1990 to 2006 Purchase Price

NEW ZEALAND	R-squared	Adjusted R-squared	S.E. of regression	Sum squared resid
	0.943053	0.939256	3.363211	169.6678
Log likelihood	Mean dependent var	S.D. dependent var	F-statistic	Prob(F-statistic)
-43.6773	36.61941	13.64593	248.4015	0
SWEDEN	R-squared	Adjusted R-squared	S.E. of regression	Sum squared resid
	0.97673	0.975179	1.676553	42.16247
Log likelihood	Mean dependent var	S.D. dependent var	F-statistic	Prob(F-statistic)
-31.84265	34.59255	10.64163	629.6167	0
NETHERLANDS	R-squared	Adjusted R-squared	S.E. of regression	Sum squared resid
	0.85779	0.848309	11.5616	2005.059
Log likelihood	Mean dependent var	S.D. dependent var	F-statistic	Prob(F-statistic)
-64.66879	65.56795	29.68507	90.47762	0

The findings nonlinear correlation analysis between the dependent variable, Growth in Home Purchase Price and the independent variable, Advancement in Technology from 1990 to 2006 for the country of New Zealand in Findings Number 7 resulted in, 0.939 Adjusted R-square, 36.619 Mean Dependent Variable, 3.363 Square Error of Regression, 169.668 Sum-of-Square Residual, 248.402 F-statistic, 0.000000 Probability (F-statistic). The findings nonlinear regression analysis in Findings Number 7 resulted in a significant correlation between the growth in the independent variable of mobile cellular subscriptions (per 100 people) data, and the growth pattern of the dependent variable of home purchase price for the country of New Zealand preceding the Global Financial Crisis of 2007 and 2008. Correlation of variables in the case of New Zealand resulted in a near-perfect correlation between the variables, which is very significant therefore the researched concluded no real estate bubble existed in the New Zealand real estate market preceding the Global Financial Crisis of 2007 and 2008.

The findings nonlinear correlation analysis between the dependent variable, Growth in Home Purchase Price and the independent variable, Advancement in Technology from 1990 to 2006 for the country of Sweden in Findings Number 8 resulted in, 0.975 Adjusted R-square, 34.593 Mean Dependent Variable, 1.677 Square Error of Regression, 42.162 Sum-of-Square Residual, 629.617 F-statistic, 0.000000 Probability (F-statistic). The findings nonlinear regression analysis in Findings Number 8 resulted in a significant correlation between the growth in the independent variable of mobile cellular subscriptions (per 100 people) data, and the growth pattern of the dependent variable of home purchase price for the country of Sweden preceding the Global Financial Crisis of 2007 and 2008. Correlation of variables in the case of Sweden resulted in a near-perfect correlation between the variables, which is very significant therefore the researcher concluded, no real estate bubble existed in Sweden real estate market preceding the Global Financial Crisis of 2007 and 2008.

The findings nonlinear correlation analysis between the dependent variable, Growth in Home Purchase Price and the independent variable, Advancement in Technology from 1990 to 2006 for the country of Netherlands in Findings Number 9 resulted in, 0.848 Adjusted R-square, 65.568 Mean Dependent Variable, 11.562 Square Error of Regression, 2005.059 Sum-of-Square Residual, 90.478 F-statistic, 0.000000 Probability (F-statistic). The findings nonlinear regression analysis in Findings Number 9 resulted in a significant correlation between the growth in the independent variable of mobile cellular subscriptions (per 100 people) data, and the growth pattern of the dependent variable of home purchase price for the country of Netherlands preceding the Global Financial Crisis of 2007 and 2008. Correlation of variables in the case of the Netherlands resulted in a very strong correlation between the variables, which is very significant therefore the researched concluded no real estate bubble existed in the Netherlands real estate market preceding the Global Financial Crisis of 2007 and 2008.

Table 4. Developed countries correlation between the dependent variable Growth in Home and the independent variable Advancement in Technology 1990 to 2006 Purchase Price

AUSTRALIA	R-squared	Adjusted R-squared	S.E. of regression	Sum squared resid
	0.964802	0.962456	2.579777	99.82877
Log likelihood	Mean dependent var	S.D. dependent var	F-statistic	Prob(F-statistic)
-39.16902	35.25528	13.31406	411.1638	0
IRELAND	R-squared	Adjusted R-squared	S.E. of regression	Sum squared resid
	0.969192	0.967138	7.383568	817.7562
Log likelihood	Mean dependent var	S.D. dependent var	F-statistic	Prob(F-statistic)
-57.04544	68.87448	40.73046	471.8847	0
BELGIUM	R-squared	Adjusted R-squared	S.E. of regression	Sum squared resid
	0.964713	0.96236	2.77902	115.8443
Log likelihood	Mean dependent var	S.D. dependent var	F-statistic	Prob(F-statistic)
-40.43374	48.25772	14.32411	410.0815	0

The findings nonlinear correlation analysis between the dependent variable, Growth in Home Purchase Price and the independent variable, Advancement in Technology from 1990 to 2006 for the country of Australia in Findings Number 10 resulted in, 0.965 Adjusted R-square, 35.255 Mean Dependent Variable, 2.580 Square Error of Regression, 99.829 Sum-of-Square Residual, 411.164 F-statistic, 0.000000 Probability (F-statistic). The findings nonlinear regression analysis in Findings Number 10 resulted in a significant correlation between the growth in the independent variable of mobile cellular subscriptions (per 100 people) data, and the growth pattern of the dependent variable of home purchase price for the country of Australia preceding the Global Financial Crisis of 2007 and 2008. Correlation of variables in the case of Australia resulted in a near-perfect correlation between the variables, which is very significant therefore the researcher concluded, no real estate bubble existed in the Australia real estate market preceding the Global Financial Crisis of 2007 and 2008.

The findings nonlinear correlation analysis between the dependent variable, Growth in Home Purchase Price and the independent variable, Advancement in Technology from 1990 to 2006 for the country of Ireland in Findings Number 11 resulted in, 0.967 Adjusted R-square, 68.87448 Mean Dependent Variable, 7.384 Square Error of Regression, 817.756 Sum-of-Square Residual, 471.885 F-statistic, 0.000000 Probability (F-statistic). The findings nonlinear regression analysis in Findings Number 11 resulted in a significant correlation between the growth in the independent variable of mobile cellular subscriptions (per 100 people) data, and the growth pattern of the dependent variable of home purchase price for the country of Ireland preceding the Global Financial Crisis of 2007 and 2008. Correlation of variables in the case of Ireland resulted in a near-perfect correlation between the variables, which is very significant therefore the researcher concluded, no real estate bubble existed in Ireland real estate market preceding the Global Financial Crisis of 2007 and 2008.

The findings nonlinear correlation analysis between the dependent variable, Growth in Home Purchase Price and the independent variable, Advancement in Technology from 1990 to 2006 for the country of Belgium in *Findings Number 12* resulted in, 0.962 Adjusted R-square, 48.258 Mean Dependent Variable, 2.779 Square Error of Regression, 115.844 Sum-of-Square Residual, 410.082 F-statistic, 0.000000 Probability (F-statistic). The findings nonlinear regression analysis in *Findings Number 12* resulted in a significant correlation between the growth in the independent variable of mobile cellular subscriptions (per 100 people) data, and the growth pattern of the dependent variable of home purchase price for the country of Belgium preceding the Global Financial Crisis of 2007 and 2008. Correlation of variables in the case of Belgium resulted in a near-perfect correlation between the variables, which is very significant therefore the researcher concluded, no real estate bubble existed in Belgium real estate market preceding the Global Financial Crisis of 2007 and 2008.

Table 5. Developed countries correlation between the dependent variable Growth in Home and the independent variable Advancement in Technology 1990 to 2006 Purchase Price

NORWAY	R-squared	Adjusted R-squared	S.E. of regression	Sum squared resid
	0.932317	0.927805	3.748944	210.8188
Log likelihood	Mean dependent var	S.D. dependent var	F-statistic	Prob(F-statistic)
-45.52313	34.37934	13.95263	206.6227	0
SPAIN	R-squared	Adjusted R-squared	S.E. of regression	Sum squared resid
	0.985525	0.98456	3.720365	207.6168
Log likelihood	Mean dependent var	S.D. dependent var	F-statistic	Prob(F-statistic)
-45.39304	64.00572	29.94061	1021.263	0
PORTUGAL	R-squared	Adjusted R-squared	S.E. of regression	Sum squared resid
	0.746631	0.72974	9.251468	1283.845
Log likelihood	Mean dependent var	S.D. dependent var	F-statistic	Prob(F-statistic)
-60.87937	89.03536	17.79589	44.20224	0.000008

The findings nonlinear correlation analysis between the dependent variable, Growth in Home Purchase Price and the independent variable, Advancement in Technology from 1990 to 2006 between the dependent variable, Growth in Home Purchase Price and the independent variable, Advancement in Technology from 1990 to 2006 for the country of Norway in *Findings Number 13* resulted in, 0.928 Adjusted R-square, 34.379 Mean Dependent Variable, 34.379 Square Error of Regression, 210.819 Sum-of-Square Residual, 206.623 F-statistic, 0.000000 Probability (F-statistic). The findings nonlinear regression analysis in *Findings Number 13* resulted in a significant correlation between the growth in the independent variable of mobile cellular subscriptions (per 100 people) data and the growth pattern of the dependent variable of home purchase price for the country of Norway preceding the Global Financial Crisis of 2007 and 2008. Correlation of variables in the case of Norway resulted in a near-perfect correlation between the variables, which is very significant therefore the researcher concluded, no real estate bubble existed in Norway real estate market preceding the Global Financial Crisis of 2007 and 2008.

The findings nonlinear correlation analysis between the dependent variable, Growth in Home Purchase Price and the independent variable, Advancement in Technology from 1990 to 2006 for the country of Spain in *Findings Number 14* resulted in, 0.985 Adjusted R-square, 64.006 Mean Dependent Variable, 3.720 Square Error of Regression, 207.617 Sum-of-Square Residual, 1021.263 F-statistic, 0.000000 Probability (F-statistic). The findings nonlinear regression analysis in *Findings Number 14* resulted in a significant correlation between the growth in the independent variable of mobile cellular subscriptions (per 100 people) data, and the growth pattern of the dependent variable of home purchase price for the country of Spain preceding the Global Financial Crisis of 2007 and 2008. Correlation of variables in the case of Spain resulted in a near-perfect correlation between the variables, which is very significant therefore the researcher concluded, no real estate bubble existed in Spain real estate market preceding the Global Financial Crisis of 2007 and 2008.

The findings nonlinear correlation analysis between the dependent variable, Growth in Home Purchase Price and the independent variable, Advancement in Technology from 1990 to 2006 for the country of Portugal in *Findings Number 15* resulted in, 0.747 Adjusted R-square, 89.035 Mean Dependent Variable, 9.251 Square Error of Regression, 1283.845 Sum-of-Square Residual, 44.202 F-statistic, 0.000008 Probability (F-statistic). The findings nonlinear regression analysis in *Findings Number 15* resulted in a significant correlation between the growth in the independent variable of mobile cellular subscriptions (per 100 people) data, and the growth pattern of the dependent variable of home purchase price for the country of Portugal preceding the Global Financial Crisis of 2007 and 2008. Correlation of variables in the case of Portugal resulted in a strong correlation between the variables, which is very significant therefore the researched concluded no real estate bubble existed in Portugal real estate market preceding the Global Financial Crisis of 2007 and 2008.

Hypothesis Testing

Ho1: The evidence from data analysis suggested, a real estate bubble did not exist in developed countries preceding the Global Financial Crisis of 2007 and 2008. **The researcher rejected H1o.**

Ha1: The evidence from data analysis suggested, a real estate bubble did exist in developed countries preceding the Global Financial Crisis of 2007 and 2008. **The researcher failed to reject H1a.**

Ho2: The evidence from data analysis suggested, technology did not lead to a significant increase in home purchase price in developed countries preceding the Global Financial Crisis of 2007 and 2008. **The researcher rejected Ho2.**

Ha2: The evidence from data analysis suggested, technology did lead to a significant increase in home purchase price in developed countries preceding the Global Financial Crisis of 2007 and 2008. **The researcher failed to reject H2a.**

Research Question Result

1. The researcher found the data presented no evidence supporting the idea, the existence of a real estate bubble in developed countries around the world preceding the Global Financial Crisis of 2007 and 2008.
2. The researcher found the data presented evidence supporting the idea, the adaptation of technology in the mortgage industry and real estate industry in developed countries around lead to a significant increase in home purchase price preceding the Global Financial Crisis of 2007 and 2008

Discussion

Based on the findings of the current study, policymakers must take a hard look at the media and themselves, because the world can no longer blame the subprime mortgage industry for causing the Global Financial Crisis of 2007 and 2008. The findings of the current study will force policymakers around the world to come to terms with the truth about the media false information that started the Global Financial Crisis of 2007 and 2008. Policymakers must also come to terms with the policy failures focused on solving a real estate bubble that did not exist leading to the worldwide economic crisis. An accurate explanation for how the worldwide economic crisis resulted in the Great Recession subsequent the financial crisis must be given by policymakers. The public must demand answers from both the media and policymakers that explain why an economic crisis that could have been avoided cause the entire global economy to collapse. Answering the difficult questions about the truth of the Global Financial Crisis could be the key to ensure an economic crisis of the same magnitude is avoided in the future.

Data analysis in the case of all fifteen developed countries in the current study suggested no real estate bubble existed preceding the Global Financial Crisis of 2007 and 2008. Based on data analysis evidence, the rapid increase in home purchase price was the result of advancement in technology for all fifteen developed countries. The result of data analysis in the current study confirmed the accuracy of former Federal Reserve Board Chairmen, Alan Greenspan and Ben Bernanke 2005 assessment which concluded the impossibility of occurrence of a real estate bubble development due to the Efficient Market Hypothesis, before reversing course subsequent their assertion in 2005 (Belke & Wiedmann, 2005; Starr,2012). The findings of the study serve as additional confirmation of Eddison Walters Risk Expectation Theory of The Global Financial Crisis of 2007 and 2008, and the need to adapt Eddison Walters Modern Economic Analysis Theory for analyzing economic data over an extended period.

The lack of consideration of the impact of advancement in technology on the transformation of both the real estate and mortgage industries resulted in economic policy failures around the world. Policymakers accepted the theory of a real estate bubble without investigating for evidence supporting the claims. The failure by the media to hold policymakers accountable by requesting evidence supporting claims of a real estate bubble and predictions of a real estate market crash is very troubling. Equally troubling is the idea the motivation of the media may have been a favorable political narrative to influence the 2008 election. Had the media held policymakers to a higher standard, policymakers would have been forced to produce evidence. Accountability by

the media could have resulted in an investigation to uncover the true nature of the financial crisis, leading to proper corrective actions, avoiding such a significant economic crisis. The media failure in their responsibility to hold policymakers accountable significantly contributed to the Global Financial Crisis of 2007 and 2008.

The result of data analysis suggested, growth in home purchase price for developed countries around the world preceding the Global Financial Crisis of 2007 and 2008 resulted from increased demand for homes, due to changes in the real estate and mortgage industries resulting from advancement in technology. The transformation of the real estate industry to online real estate listings and the transformation of the mortgage industry from automated underwriting and online mortgage applications shifted the demand curve in the real estate market. The shift in the demand curve resulted from an exponential number of new qualified home buyers in the market. Economist analyzing the increase in home purchase price made a significant error by analyzing all data on a demand curve that no longer existed by early 2000. The most critical error in the false conclusion of the existence of a real estate bubble was, the failure to consider the shift in the demand curve resulting from advancement in technology.

The widespread acceptance of the theory of a real estate bubble by policymakers around the world and the implementation of policies similar to TARP, which was implemented with the focus on bank bailouts, while ignoring the real problem of the lack of mortgage lending. Policymakers around the world implemented policies in response to the financial crisis in the same way TARP was implemented by U.S. policymakers. The implementation of policies with no investigation to gain an understanding of the true nature of the economic challenges was a critical error leading to a complete collapse of the worldwide economy and the Great Recession. At a time when data was abundant and at the fingertips, there was no excuse for policymakers implementing drastic measures such as the policies which were implemented in response to the financial crisis in countries around the world, based on junk science.

The Global Financial Crisis of 2007 and 2008 was a catastrophic failure of epic proportions at every level. The worldwide economic crisis dragged on for several years based on the false conclusion of a real estate bubble, significantly affecting families with lower income more than any other segment of the population around the world. The Global Financial Crisis was a massive transfer of real estate wealth away from lower and modest-income families.

The media played a significant role in causing the Global Financial Crisis of 2007 and 2008. The dissemination of false information of a real estate bubble and predictions of a real estate market crash were critical factors that set the Global Financial Crisis of 2007 and 2008 in motion. The media acceptance of the false narrative and failure to hold policymakers accountable in favor of a political narrative was a significant avocation of their responsibility to the entire world.

The role the financial market played in causing the Global Financial Crisis of 2007 and 2008 was a significant factor. The irrational reaction by the financial market based on false information from the media started the economic crisis. Once the turmoil in the financial market started, the market exhibited a herd mentality, and the entire market ran in the same direction without stopping to evaluate the true nature of the crisis. Financial regulators also failed to contain the crisis.

The result of data analysis in Hyatt (2020), provided evidence of the critical nature of errors made by U.S. policymakers that changed TARP from the original intent. The original intent of TARP was to invest in mortgage-backed securities to restart mortgage lending. Policy changes to TARP by the U.S. Administration focused on saving the banks but provided little assistance to homeowners experiencing economic hardship. As a result of the changes to TARP, policymakers used taxpayers' funding to take ownership stakes in banks, providing the liquidity for banks to continue operations with the bank-bailout. Struggling homeowners, whose taxes assisted funding the bank-bailout, got very little in return because there was no mandate for rescued banks receiving taxpayer dollars to refinance mortgages for homeowners experiencing hardship.

Failure by policymakers more focused on a political narrative than an investigation to uncover the true nature of the economic crisis was an inexcusable error. The significant error by policymakers deepened the economic crisis. The focus on bank rescue programs similar to TARP with the priority of solving the problem of a real estate bubble that did not exist failed to address the real problem which was the need to restart mortgage lending. The crisis based on false information continued for years without assessment to understand the effectiveness of

policies that were implemented. The failure to take a critical look at the Global Financial Crisis of 2007 and 2008 to ensure the same mistakes were not made over and over, was also a critical error by policymakers around the world.

The failure by economists that did not consider the effect of technology adaptation in the real estate and mortgage industries was another key factor leading to the Global Financial Crisis of 2007 and 2008. The politicization of quantitative analysis, which should never consider personal opinions as scientific evidence when conducting economic analysis, was a significant factor leading to the Global Financial Crisis of 2007 and 2008. The abandonment of scientific analysis in favor of political analysis has created a crisis in quantitative analysis, resulting in unreliable data analysis. The failure by economists to conduct analysis based on scientific research must be addressed to avoid future errors in economic data analysis leading to another crisis.

The failure by economists to consider the impact of technology on economic data continues today. The evidence suggested the theory of a real estate bubble is a theory lacking credibility and economic foundation. The researcher in the current study therefore introduced Walters Real Estate Bubble Impossibility Price Transparency Theory. The foundation of the theory is based on the Efficient Market Hypothesis. The theory underscores the following points:

1. There may be a rear occurrence of price distortion in isolated real estate markets from time to time.
2. Price distortions in an isolated real estate market most likely may be the result of illegal activity or false information influencing the real estate market, as was the case preceding the Global Financial Crisis of 2007 and 2008.
3. Based on the existence of real estate price transparency, the likelihood of any widespread real estate bubble occurrence is not possible based on the Efficient Market Hypothesis.

The lack of evidence supporting the theory of a real estate bubble in the literature is quite troubling. The idea, there exists such a broad consensus of the existence of a real estate bubble without analyzing reliable data in support of the widely accepted theory underscores the need for the development of new theories focused on avoiding critical errors in economic analysis of the same magnitude in the future.

The result of data analysis in the current study served as additional confirmation of, Eddison Walters Risk Expectation Theory of The Global Financial Crisis of 2007 and 2008. The current study also presented additional evidence supporting the need to adapt Eddison Walters Modern Economic Analysis Theory when analyzing economic data over an extended period. The current study provided further confirmation of the accuracy of former Federal Reserve Board Chairmen, Alan Greenspan, and Ben Bernanke 2005 assessment which concluded the occurrence of a real estate bubble development was impossible due to the Efficient Market Hypothesis (Belke & Wiedmann, 2005; Starr,2012). Both former Federal Reserve Board Chairmen reversed their conclusions subsequent to their assertions in 2005.

Walters Real Estate Bubble Impossibility Price Transparency Theory is presented in the current study. The new theory continues the development of theories needed to address potential errors such as the error discussed in the current study. Continued research and development of theory focused on the reliability and validity of economic analysis will significantly lower the risk of data distortion from the lack of consideration of the effect of advancement in technology in economic data. Continued development of theory on the subject, can assist in preventing the same mistakes, leading to another significant economic crisis in the future.

A significant problem in quantitative research is changing factors that are assumed to be constant, leading to data distortion which amounts to junk science. The politicization of quantitative analysis has exasperated the problem leading to policies that expose the global economy to significant risks. The error of changing factors that are assumed to be constant, leading to unreliable data analysis, was quite apparent by acceptance of false conclusions of a real estate bubble, and today is quite apparent in climate change policy and policies to combat COVID-19.

There are many unknowns about the world and the universe, but the area where there is no dispute is the dynamic nature of the universe. Changes in the gravitational pull as the earth rotate on the axis and around the

sun, planetary alignment, the position of the moon, and the asymmetrical nature of the earth are all factors that result in the occurrence of events in the solar system which can be decades apart. This is due to the constant changes in the universe. Climate change policies are based on assumptions that fail to recognize the dynamic nature of the universe and pretend the universe is static in data analysis. The assumption the factors remain constant result in findings that are not grounded in scientific research.

Data analysis and developed policies aimed at reversing climate change based on false assumptions, significantly increasing risk to the global economy. Analysis of climate change fails to consider changing factors at work in the universe. A common error made by researchers analyzing climate change is another example of data distortion resulting from the lack of consideration of changing factors, which is the same error that resulted in the false conclusion of a real estate bubble preceding the Global Financial Crisis of 2007 and 2008. The commitment of significant resources away from priorities with the potential of significant efficiency gains throughout the global economy, along with the adaptation of policies that significantly decrease efficiency in favor of combating climate change is misguided. The assumption of all else being equal is a significant error and another example of false information that can have significant consequences for the global economy.

There are also significant questions regarding the reliability and validity of analysis on COVID-19 data resulting from changing factors assumed to be constant, resulting in policies based on false information. Changing factors such as the health of a population resulting from changes in the diet and other behaviors which are more or less acceptable from country to country, the difference in population density, and climate changes are all changing factor which has been assumed to be constant that can have a significant effect on the spread. The assumption changing factors are constant in the case of COVID-19 is the very same error that led to the false conclusion of a real estate bubble preceding the Global Financial Crisis of 2007 and 2008.

The researcher in the current study announces the development of Walters and Djokic Quantitative Analysis Factor Distortion Theory. The goal of the theory is to address changing factors assumed to be constant in quantitative research analysis with significant potential to distort the findings from data analysis that is currently ignored by researchers. The theory states the following:

1. It is a significant error to assume changing factors are constant in quantitative analysis.
2. The assumption of changing factor to be constant ignores a key principle of quantitative analysis on which conclusions from data analysis are based which is, "all else being equal".
3. Changing factors assumed to be constant in quantitative analysis result in significant data distortion resulting in a lack of reliability and validity of finding in quantitative research.

In the upcoming study, Walters and Djokic Quantitative Analysis Factor Distortion Theory will continue the development of steps to be taken in the literature to address changing factors assumed to be constant with the potential to cause data distortion errors in quantitative research.

8. Areas of Future Research

The are several areas that must be considered for future studies. Recent politicization of quantitative data analysis has ignored key factors critical to scientific research, which can significantly distort the findings from data analysis resulting in false conclusions. The reliability and validity of quantitative data analysis require researchers to account for changing factors. Changing factors that are assumed to be constant in quantitative research is a significant error. Future research aimed at addressing the reliability and validity of quantitative data analysis is required. The widespread acceptance of the theory of a real estate bubble by policymakers around the world and the implementation of policies similar to TARP, which was implemented by policymakers without investigation to gain an understanding of the true nature of the Global Financial Crisis of 2007 and 2008, is an area of research for future studies. Future research aimed at accurately reflecting the true nature of the Global Financial Crisis of 2007 and 2008 and the significant economic policy errors by policymakers around the world in response to a real estate bubble that did not exist is also needed.

9. Conclusion

Based on the result of data analysis the evidence suggested, growth in home purchase price for developed countries preceding the Global Financial Crisis of 2007 and 2008, resulted from increased demand for homes. The increased demand for homes was due to the adaptation of technology in the real estate industry and the mortgage industry. The move to online listings and online mortgage loan applications, along with automated underwriting between 1995 and 1999 shifted the demand curve for homes.

There are continued claims of the existence of real estate bubbles in many countries around the world today. The claims are based on the lack of understanding of the significant impact of advancement in technology on the increased demand for homes, along with the impact of economic policies that stifled home inventory levels that was aimed at a real estate bubble that did not exist. The lack of understanding resulted in an almost complete shutdown of real estate development for several years subsequent to the Global Financial Crisis of 2007 and 2008. The shutdown occurred just as demand in housing markets around the world was entering a rapid growth stage from the significant increase in demand, which is very common following changes due to innovation in many industries.

The lasting effect of the false conclusion of a real estate bubble and the effect on economies around the world resulting from the false media narrative is very significant. The failed economic policies aimed at solving a real estate bubble that did not exist have resulted in an even greater acceleration of growth in home purchase prices. The rapid acceleration in the growth of home purchase price is due to the significant increase in demand for homes, along with inadequate levels of housing to meet demand in many countries around the world.

The combination of the increase in demand for homes and the shortage in home inventory levels have become a potential looming housing crisis for moderate-income families in many countries around the world. Due to market forces, there has been a rapid acceleration of the increase in home purchase prices resulting from a significant shortage in home inventories. Many economists in countries around the world have made the same error, falsely concluding the existence of a real estate bubble today. The shortage in home inventory has

significantly increased the cost of rental housing. The current housing situation has exposed a potential housing crisis for moderate-income families in many countries around the world. The looming housing crisis for moderate-income families priced out of the housing market is a challenge requiring immediate attention from policymakers. Failure of action by policymakers to address challenges associated with the significant increase in the cost of housing, as the world address challenges associated with Covid-19, could result in a significant worldwide homeless crisis.

The lack of understanding of the impact of technology on home purchase price was a significant error leading to the Global Financial Crisis of 2007 and 2008. The early-stage adaptation of widespread use of technology through the economy dates back about two and a half decades. The recent widespread incorporation of technology across the global economy has resulted in very few experts possessing a deeper understanding of the significant effect of advancement in technology on the economy. Significant research is needed in the area to gain a deeper understanding of the disruptive nature of advancement in technology that continues to drastically alter the sharing of information throughout the economy today.

The overwhelming evidence of correlation for the independent variable representing advancement in technology, and the dependent variable representing home purchase price uncovered evidence suggesting, advancement in technology was the most significant factor causing the significant increase in home purchase price in developed countries around the world preceding the Global Financial Crisis of 2007 and 2008. The current study concluded, there is no possibility of the existence of widespread real estate bubbles in real estate markets resulting from price transparency.

Walters Real Estate Bubble Impossibility Price Transparency Theory was presented in the current study due to overwhelming evidence which suggested, the existence of a false conclusion of a real estate bubble preceding the Global Financial Crisis of 2007 and 2008. The result of data analysis on home purchase price in fifteen developed countries around the world in the current study, in addition to data analysis on home purchase price in the United States in previous studies, resulted in the findings, no real estate bubble existed in the total of sixteen developed countries with a rapid increase in home purchase price around the world during the period preceding

the Global Financial Crisis of 2007 and 2008.

The development of Walters Real Estate Bubble Impossibility Price Transparency Theory was developed to end any dispute that may persist by frequent claims from economists' constant suggestions of the existence of real estate bubbles around the world today. The level of real estate price transparency existing in most countries, especially in developed countries, makes the likelihood of the existence of a real estate bubble impossible. The foundation of Walters Real Estate Bubble Impossibility Price Transparency Theory is based on the Efficient Market Hypothesis. The goal of the new theory is to end false claims of real estate bubbles that persist around the world today. The adaptation of Walters Real Estate Bubble Impossibility Price Transparency Theory will avoid the error of false information of a real estate bubble leading to an economic crisis in the future.

False information of a real estate bubble and predictions of a real estate crash disseminated through mainstream media and social media can be a destructive force with a disastrous effect on the economy around the world. The failure by the media to hold themselves and policymakers to a higher standard resulted in the Global Financial Crisis of 2007 and 2008. The challenge for policymakers is a difficult balancing act of holding the media accountable while protecting the freedom of the press.

The current study exposed an even greater challenge that must address. The challenge is to reduce the risk of the likelihood of another worldwide economic crisis. Collection of data and disproportional control information sharing by a small number of media and technology companies are a problem with significant consequences for the worldwide economy. The limited number of technology companies' dominating control over the world's economy through data collection and information sharing, give these companies greater control of the economy policymakers themselves. The sharing of information is the foundation of the development of the theory of the firm. The firm is the basic building block of the world's economy. Allowing a small group of private industry companies to continue disproportional control of information shared around the world exposes the global economy to significant risk.

The lack of competition for many in the technology sector, the control of news media organizations by technology companies and recent censorship policies, along fact check policies by individuals with no expertise on the subject matter, adopted by both mainstream media and social media companies, significantly increase the likelihood false information could lead to another worldwide economic crisis. The idea of the current study and previous studies on the Global Financial Crisis of 2007 and 2008 by the current researcher, based on evidence from data collected by government databases, can be censored because the findings of studies fall outside the narrative widely accepted throughout the current literature is very troubling. Steps must be taken to reduce the likelihood of another worldwide economic crisis resulting from false information

An area of concern highlighted by the findings of the current study and other studies by the current researcher, is the potential danger from the expanding role of private-sector technology firms in the economy, with monetary policy through cryptocurrency. Significant risk exists which is associated with diluting control of monetary policy away from central banks to technology sector companies with dominant control over the sharing of information which is the foundation of the economy. The European Debt Crisis should serve as an example of the risk associated with countries that do not have full control of a central bank and monetary policy as a tool to stabilize economies. The potential lack of full control of monetary policy by central banks in favor of allowing cryptocurrency by private sector companies in the technology industry, along with technology companies' control of the economy through the sharing of information put the global economy at significant risk.

The risk exposure to the global economy from the dissemination of false information is substantial. The risk created by consensus on climate change policies developed based on data analysis with false assumptions amounts to junk science, with significant economic risk to the global economy. Significant resources along with policies aimed at reversing climate change with very little evidence presented on the effectiveness have the potential to cripple economies, leading to an economic crisis. A significant error made in data analysis on climate change, and COVID-19 is the assumption, changing factors remain constant. The error is the same error that led to the false conclusion of a real estate bubble preceding the Global Financial Crisis of 2007 and 2008.

Lessons learned from the Global Financial Crisis of 2007 and 2008 can assist in preventing another worldwide economic crisis in the future, but swift action must be taken by policymakers to reduce the risk associated with the dissemination of false information throughout the economy. Lessons from the financial crisis should serve as

an example of the critical nature of the need to diversify the sharing of information throughout the economy and the devastation that can result from false information. The current study has established there is a significant contribution that can be gained from dissenting ideas falling outside the consensus of the mainstream. The sharing of accurate information is such a critical factor in the economic well-being of the global economy, steps must be taken to limit risk from false information causing a future global economic crisis.

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The Liquidity Discount in the Italian Market

Emanuel Bagna[1]

[1] Pavia University, Italy

Correspondence: Emanuel Bagna, Pavia University, Via S. Felice Al Monastero 5, 27100 Pavia PV, Italy.

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Abstract

The illiquidity discount represents the reduction in the value of an asset because it cannot be easily sold. It is usually applied by appraisals in valuing a minority interest in a closely-held business. This article presents a literature review of the illiquidity discount and an analysis of the level of discount in Italy during the period 2003 - 2012. The analysis conducted made it possible to verify: a) the existence for the Italian market of a discount for lack of liquidity for shares with less turnover; b) the variability over time of that discount, thus agreeing with the literature that has found the premiums for liquidity risk vary over time. The discounts that were found are, nonetheless, smaller than those indicated in the literature. The descending trend over time for the discount would seem to be particularly consistent with the studies on restricted stocks.

Keywords: valuation, liquidity discount, market multiples

JEL classification: G32, G12, G30

1. Introduction

When deciding whether to acquire a minority stake in an unlisted company, an expert normally has to apply a discount because of the lack of liquidity. The discount is justified by the increased costs the investor would incur when selling the stake, because the company is not listed on a stock market. Compared to a stake in a listed company, an investor would incur:

- increased transaction costs;
- an opportunity cost determined by the time need to find a counterparty;
- the (specific and systemic) risk that, during the period needed to find a counterparty, the market conditions or the state of the company itself could take a turn for the worse.

The same Appendix A of IAS 36 on estimating the recoverable value of goodwill and a company states, in paragraph 1, "*Using present value techniques to measure value in use*" as in the calculation of the present value of an asset must also take into account *"…other, sometimes unidentifiable, factors (such as illiquidity) that market participants would reflect in pricing the future cash flows the entity expects to derive from the asset.*"

In principle, the discount in question should make an investor indifferent to two alternative assets - one liquid, one illiquid - with the same payoff. In other words, the illiquid investment should offer forecast returns above those expected from the liquid asset.

When it comes to actually appraising such a discount, there is little debate about the need to apply a discount to the fundamental value of an illiquid security or pool of securities (such as a stake in an unlisted company) because of the lack of liquidity, but there is plenty of debate about the method to be used to estimate the discount and the size of the discount.

Focusing on the method for estimating the discount, there are two options.

a) The first option is actually used in practice and involves applying a discount for the lack of liquidity after having appraised the stake as if it were liquid;

b) The second option comes from the literature and involves applying a premium to the opportunity cost of capital for the liquidity risk.

This article starts by defining the liquidity attribute for a security (or a stake) before conducting an assessment to determine if and to what degree liquidity is "priced" by the market. This is followed by a presentation of the

theoretical framework underlying adjustments to discount rates for a lack of liquidity. The third section looks at the various methodologies found in the literature to determine the liquidity discount, focusing specifically on the limits of those methodologies. The final section presents a model for determining the discount based on the Italian market between 2003 and 2012.

2. Liquidity and Markets

The liquidity of an asset refers to the speed and ease with which it can be transformed into cash when desired, at a fundamental value and without having to give up part of the value because of the urgency of the sale.

Is illiquidity is an isolated issues that only troubles unlisted securities, or is it also found in financial markets?

Answering this question requires setting out two measurements: one that shows the speed with which a financial asset can be sold and the other that shows the probability of selling it at a discount. In the literature, these two measurements are known respectively as turnover and the bid-ask spread. Turnover is the number of shares transacted in a specific period compared to a company's total number of shares. By contrast, the bid-ask spread shows the differential between the purchase price and the sales price for a listed share on the same date. This indicator is generally expressed in relation to the price of the security, so as to obtain a discount measurement.

In efficient markets, the high numbers of trades for a security ensure a stake can be rapidly sold, just as a low bid-ask spread ensures the security can be sold at a price close to the fundamental value. In a diametrically opposed sense, low volumes and a high bid-ask spread make it possible to transfer a stake at a price that is quite far removed from the fundamental value, at a significant discount. Take, for example, the purchase of €200,000 worth of securities in a liquid company and the same amount in an illiquid company. For 2020, the annual average daily bid-ask spreads (relative to the price) are 0.05% and 5.93% respectively. Moreover, the securities have an annual average daily turnover of 0.31% and 0.01% respectively. Assuming theoretical capital gains for both securities of 12%, an investor decides to sell both assets. With capitalisation at 31/12/2019 for both securities of €2,801 million and €70 million respectively, there would be no problem selling the liquid security as the average daily volume (0.31%) effectively guarantees a rapid sale. Imagining brokerage fees of 20 basis points and a bid-ask spread equal to the annual daily average, the gains would be 11.75% (equal to 12%-0.20%-0.05%=11.75%). The scenario is not the same for the illiquid asset, where the realisable gain would be far lower (12% - 0.20% - 5.93% = 5.87%). Additionally, such a gain might be purely theoretical because, as the capital share owned by the investor is equal to 0.32% (200,000 x 1.12% / 70,000,000), the market would only be able to absorb such an amount in 32 days (32 = capital share held / average daily turnover = 0.32/0.01).

This example shows how liquidity is also an issue that is relevant to regulated markets.

Accepting the hypothesis that securities lacking liquidity offer higher returns, one would expect to find relatively lower prices for these securities if the fundamentals are basically the same. Likewise, highly liquid securities should have relatively high prices. This means the share price discounts because of the lack of liquidity should be matched by risk premiums in the discount rates of the expected results (cost of capital). This is the outlook adopted by the IAS and referenced in the introduction.

Imagine, for example, two companies (Alfa and Beta) with identical payoffs, but with different liquidity levels. Let's assume the value of both securities can be calculated using a dividend discount model (DDM). The dividends are equal to 10, the cost of capital - calculated according to the Capital Asset Pricing Model - is 10%, the dividend growth rate in perpetuity is 0 and the book value is 100. The value of both securities is:

$W_{Alfa} = W_{Beta}$ = Dividend/Cost of Capital = 10/0.10 = 100,

and the Price to Book Value multiple (P/BV) is:

$P/BV_{Alfa} = P/BV_{Beta} = W_{Alfa} / BV_{Alfa} = W_{Beta} / BV_{Beta}$ = 100/100 = 1 x.

The risk premium for a lack of liquidity for Alfa is 1% (to be added to the cost of capital) and the premium for Beta is 0. The value and multiple of the equity for the Beta security would remain unchanged, but for the Alfa security, the value and multiple would be less:

W_{Alfa} = 10 / (0.10 + 0.01) = 90.91

P/BV_{Alfa} = 90.91/100 = 0.91 x

3. Adjusting Cost of Capital for Lack of Liquidity

The efficiency of financial markets means that two activities with the same payoff (same forecast cash flow and

identical risk) must have the same price.[1] Any discrepancy would open up the possibility of making a profit without taking on the risk (arbitrage), buying the undervalued asset and selling the overvalued one. The greater any such price divergence (and hence profit), the greater the number of investors that would be interested. The excess of demand (offer) for the undervalued (overvalued) asset would lead to a realignment of prices, guaranteeing market equilibrium and efficiency. Now, let us assume we have two securities - one liquid and the other illiquid - available on the same market, with an identical payoff but consistently different prices. Is our only conclusion that the market is inefficient?

If one accepts the hypothesis that securities lacking liquidity have an opportunity cost of capital above what is justified by the covariance between their returns and those of the market, the answer would probably be "no".

Amihud and *Mendelsson* (1986) were the first to demonstrate that securities with a high bid-ask spread have higher yields. Focusing on the period 1961-1980, their analysis showed how the average monthly returns on securities listed on US markets with a higher bid-spread ask were 67 basis point above that of securities with a lower bid-ask spread.[2]

However, it was a subsequent study by *Roll*, *Chordia* and *Subrahmanyam* (2000) that questioned the Capital Asset Pricing Model, showing liquidity risk is systemic and so hard to diversify. *Achraya* and *Pedersen* (2003) then used this study as a basis to go further and show that illiquid securities have a risk premium 1.1% higher than that of liquid securities, and that such a premium was largely explained (80%) by the covariance between the liquidity of a security and the liquidity of the market. Hence, the differential in the illiquidity risk premium between illiquid and liquid securities is greater during periods in which the market itself is illiquid. *Stambaugh* and *Pastor* (2003) reached the same conclusions.

The difficulty in estimating the coefficients for the sensitivity of the liquidity of a security to changes in market liquidity (liquidity beta) led to various authors proposing adjustments to rates only on the basis of turnover or the bid-ask spread of a security. *Amihud* and *Mendelsson* (1989) proposed adjusting rates by 24/26 basis points annually for each percentage point increase in the bid-ask spread. Assuming the same cost of capital for Boero Bartolomeo and Italcementi shares (calculated using the Capital Asset Pricing Model) at 7%, the adjustment of that cost for Italcementi would be almost zero (0.12% = 0.05% x 0.24%), while for Boero Bartolomeo it would be significant (1.42% = 5.93% x 0.24%). By contrast, *Datar*, *Nair* and *Radcliff* (1998) proposed using turnover levels for such an adjustment. Their idea was for each percentage point increase in turnover, one should see a 0.54% drop in the annual expected returns. Taken together, these studies show discount rates should be adjusted for a security's liquidity risk. However, the lack of a universally accepted model and, more importantly, a model that can be used in practice (neither bid-ask spread nor turnover can be used for unlisted securities) leads to the notion it is best to initially estimate the value of an illiquid minority stake as if it were liquid and then apply a discount for lack of liquidity. Precisely such an approach is recommended by the American Institute of Certified Public Accountants (AICPA) in the exposure draft on standards for valuation.[3] In point 42 of the document, one finds: *"Examples of valuation adjustments for valuation of a business… include a discount for lack of marketability and a discount for lack of control.*"

4. A Discount for a Lack of Liquidity: Review of the Proposed Methods (Literature Review)

The methodologies proposed in the literature (both academic and non) to estimate the discount for a lack of liquidity hinge on finding situations in which a security is simultaneously traded on an organised market (liquid) and independently (illiquid). This is precisely the case for "restricted stocks" - shares of listed companies that are placed privately without soliciting funds from the public at a significant discount compared to the same shares traded on the market. An alternative is securities sold to a third-party company before being placed on the stock market. These studies (called "*IPO studies*" below) are based on the details of how the shares for companies about to list are sold at a discount on the placement price. The third area of study focuses on comparing the multiples for the purchase of a controlling stake of a listed companies with the same multiples for comparable unlisted companies (called "*Public/private company transactions"* below).

A) Restricted stocks

Most of the information about the discount for lack of liquidity comes from studies of restricted stocks. These

[1] In the literature, this relationship is known as the law of one price.

[2] Expressed in annual terms, this corresponds to an 8% yield premium for securities with less liquidity, meaning it is close to the historical risk premium for the S&P 500!

[3] "Proposed Statement on Standards for Valuation Services", AICPA, March 2005.

are shares of listed companies that are placed privately with a restricted section of the public, without any prospectuses being published. As a consequence, the American supervisory authority (the Securities Exchange Commission or SEC) bans the resale (on a regulated market) of securities so acquired for a year (SEC Rule 144). Such a security is illiquid and so it is placed at a significant discount compared to the prices for the same shares listed on the market.

Table 1 shows the liquidity discounts since the SEC study in 1969. The table highlight that the discount is less for those samples of companies analysed in the more recent past. For example, the study conducted by Columbia Financial Advisor underscores how, between 1996 and 1998, the discount dropped from 21% to 13%. This could be tied to a rule change for trading restricted stocks (SEC Rule 144), as before 1997 there were more restrictions on the sale of such securities (a restricted stock could only be sold two years after its purchase). This downward trend might also be explained by the general increase in available liquidity in recent years, with the consequent (upward) pressure on the prices of illiquid assets.

Table 1. Discount for lack of liquidity derived from the restricted stock studies

Study	Period for study	Average Liquidity Discount
SEC	1966-1969	26%
Gelman	1968-1970	33%
Trout	1968-1972	33%
Maher	1969-1973	35%
Moroney	1969-1973	36%
Stryket, Pittock	1978-1982	45%
Hall, Polacek	1979-1992	23%
Hertzel, Smith	1980-1987	14%
Management Planning, Inc.	1980-1995	28%
FMV Opinions, Inc.	1980-1997	22%
Willamette	1981-1984	31%
Silber	1981-1988	34%
Bajai, Denis, Ferris, Sarin	1990-1995	7%
Johnson	1991-1995	20%
Finnerty	1991-1997	20%
Columbia Financial Advisor (1)	1996-1997	21%
Columbia Financial Advisor (2)	1997-1998	13%

Source: our calculations using *Pratt* (2001) and *Hitchner* (2003), *Bajai et al.* (2001) and *Finnerty* (2002)

One key aspect that is common to all these studies is the significant dispersion of the discount within the sample. *Silber* (1991) was the first to seek the reasons for this. He showed that larger, more financially solid companies had a smallish discount at 14%, but small, less financially solid companies had an average discount of 60%. Subsequent studies have confirmed this[4] using different variables for the health/risk of a company[5] and its size.

The primary limitation of such studies is that the discount is measured over lengthy periods, up to a decade at times. This paper has already highlighted the time relevance of the liquidity of a security. It is highly unlikely that, say, the stock for a tech company had the same illiquidity characteristics (and consequently the same discount) in early 2000 at the height of the bubble and in September 2001 (when the Twin Towers were attacked).

Such studies also suffer from the potential limitation that, in the selected private placements, the transfer of stock is to company insiders. Thus, the discount could be due to alternative forms of bonuses/compensation.

Let us now imagine we have purchased shares in a listed company through a private placement. This entails

[4] See, for example, *Bajaj*, *Denis*, *Ferris* and *Sarin* (2001).

[5] Such as the volatility of profits, of market returns and so on.

giving up the ability, guaranteed by an efficient regulated market, to sell them at their fundamental value, without having to grant any discounts. However, if the ability to sell an asset at a set price (fundamental value) is the same as a defined put option, we can see the purchase of the security in a private placement as implicitly giving up a put option for the same security. Such reasoning drove *Chaffee* (1993) to see the liquidity discount implicit in the purchase of restricted stocks as an option. He argued the difference between the purchase price for a security in a private placement and the related market price was the equivalent of the price of a put option (at the money) for the security. Since the key aspects that determine the price of an option are its maturity and the volatility of the underlying, it follows that the liquidity discount on a stake would increase as:

- the uncertainty and risk of the investment increase (as reflected in increased price volatility);
- the period for which the security is illiquid increases, in this case equal to one year.

Chaffee does show an effective correlation between the discount for lack of liquidity applied to restricted stocks and the price for a put option at the money with maturity at one year for the same security,[6] but using such a methodology to determine the discount for completely illiquid securities (and thus not restricted stocks) would be complicated in practice as, in reality, the data to calculate the volatility of returns is not available.

B) IPO studies

One way of measuring the liquidity discount is to compare the sale prices for a share prior to a company being listed and the prices after listing. Such an approach is adopted by *Emory, Willamette Management Associates (WMA)* and *Hitchner.*[7] Emory found the average discount for lack of liquidity was 45%, based on an examination of the transactions in the five months prior to a company listing. The available details also show the discount for lack of liquidity determined using this approach is independent of the period in which the transaction was performed. The average discount is between 40% and 45% for the period 1980-2000, with the only exclusions being 1980-1981 (average discount of 66%) and 1997-2000 (average discount of 52%[8]). The study found that, during other periods, liquidity was only minimally linked to the time period.

Contrastingly, the studies by *WMA* and *Hitchner* found the discount to be variable in relation to the period in which it was calculated (discounts ranged from a minimum of 31.8% for 1991, to 73.1% for 1984).

One of the criticisms tabled against the *Emory*, *WMA* and *Hitchner* studies is the different types of investors involved in the purchase. In many cases, the purchase of a security prior to its placement is done by stakeholders within the company (management or venture capitalists), while the post-listing purchases are generally by non-strategic investors. Thus, the discount for purchasing a package of shares could be due to it being some form of bonus/compensation for the company's management or a form of remuneration for the services provided by a venture capitalist.

Secondly, the discount calculated using such an approach could be distorted by divergent growth prospects for the company between when the private transaction occurred and the moment when the company's shares were listed.[9] A portion of the difference between the prices for pre and post placement discounts could be due to increased uncertainty about a company's future.

Let us use an example to explore the logic underlying this criticism. Imagine a venture capitalist purchases a minority stake in a company that is planning to list. The company can be analysed using a dividend discount model (DDM). The dividend per share is 10, the cost of equity is 10% and the dividend growth rate is 1%. The dividend growth rate is uncertain because the company is in the middle of negotiations that could lead to a joint venture with a competitor that would increase the dividend growth rate in perpetuity to 3%. Should the negotiations prove successful (we assume a 10% probability of success) the company will list. What would the company be worth in this case? Should the joint venture come to fruition, the value would be:

$W_{\text{cum joint venture}} = D / (coe - g) = 10 / (0.10 - 0.03) = 10 / 0.07 = 142.86$

[6] The value of the put option at the money is calculated using the Black Scholes formula.

[7] The database for the Emory analysis is available at: http://www.emorybizval.com/.

[8] For this period, *Emory* divided the sample into tech stock (dot.com) and non-tech stock. The discount for tech stock was 54%, while for the others it was 44%.

[9] The *WMA* studies looked at all the transactions in the three years prior to the IPO, adjusting the discount for a lack of liquidity for any change in the P/E multiple for the industry in which the company operates in the period prior to placement.

But if the joint venture never actually happens:

$W_{ex\ joint\ venture} = D / (coe – g) = 10 / (0.10 – 0.01) = 10 / 0.09 = 111.11$

The fair value for the security would be the sum of the probability of the two events happening, multiplied by the values calculated previously:

$W = W_{cum\ joint\ venture} \times 0.10 + W_{ex\ joint\ venture} \times 0.90 = 142.86 \times 0.10 + 111.11 \times 0.90 = 114.29$

Imagine an investor purchases a minority stake in the company at fair value, receiving a discount for lack of liquidity of 30%. The transaction would take place at €80 per share (114.29 x 0.70 = 80). Now, let's also imagine the negotiations prove successful. The fundamental value of the share would be €142.86 per share. Drawing on the methodology adopted by *Emory*, the discount would be 44% (1-80/142.86), but the discount actually negotiated is 30%.

C) Public/private company transactions

The third approach to estimate the discount for a lack of liquidity is based on comparing observable multiples for listed companies and observable multiples for unlisted companies. *Koeplin, Sarin* and *Shapiro* (2000) selected 84 transactions to purchase majority stakes in the United States and 108 transactions outside of the US. For each purchase of an unlisted company, a comparable transaction (industry, year and nation) was found for a listed company. The liquidity discount was then calculated using this formula:

> Liquidity Discount = 1 – [(Implied Market Multiple in the acquisition of unlisted companies) / (Implied Market Multiple in the acquisition of listed companies)]

Table 2 provides the information from the verification by the authors. Referring only to the statistically significant discounts, it becomes evident the median discount for a lack of liquidity in the United States varies from 18.14% to 30.62%, depending on whether one uses the Enterprise Value/Ebitda multiple or the Enterprise Value/Ebit multiple. Internationally, the discount in question has significantly different values depending on whether one uses the Enterprise Value/Ebit multiple (discount of 5.96%) or the Enterprise Value/Ebitda multiple (23.49%).

Table 2. Discounts for lack of liquidity identified by the *Koeplin, Sarin* and *Shapiro* analysis

	US Transactions		***International transactions***	
Multiple implicit in Acquisitions of Unlisted Companies	**Median**	**Average**	**Median**	**Average**
Enterprise Value/Ebit	8.58	11.76	11.37	16.26
Enterprise Value/Ebitda	6.98	8.08	7.1	11.96
Enterprise Value/Book Value	1.85	2.35	1.35	2.41
Enterprise Value/Sales	1.13	1.35	1.35	2.63
Multiple implicit in Acquisitions of Listed Companies				
Enterprise Value/Ebit	12.47	16.39	12.09	28.97
Enterprise Value/Ebitda	8.53	10.15	9.28	25.91
Enterprise Value/Book Value	1.73	2.86	1.68	3.7
Enterprise Value/Sales	1.14	1.32	1.63	4.59
Implicit liquidity discount				
Enterprise Value/Ebit	30.62***	28.26***	5.96**	43.87***
Enterprise Value/Ebitda	18.14***	20.39***	23.49*	53.85**
Enterprise Value/Book Value	-7.00	17.81***	19.64	34.86
Enterprise Value/Sales	0.79	-2.28	17.18	42.70

*One asterisk indicates a data significance level of 10%, two asterisks, a significance of 5%, three asterisks a high statistical significance (1%).

Source: adapted from *Koeplin, Sarin* and *Shapiro* (2000)

The major criticism of *Koeplin, Sarin* and *Shapiro* is whether a private and a public company can actually be compared. Moreover, the study fails to analyse variables that might also influence the extent of the discount (such as the company's profitability).

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Accepting that a liquidity discount must make an investor indifferent as to whether to invest in liquid securities or illiquid securities with an identical payoff, it become possible to assign a score on three elements for the models summarised above:

A) Degree to which the payoff is identical between the liquid and illiquid asset;

B) Effective comparability of the sale price of the liquid asset and the price of the illiquid asset;

C) The temporal dispersion in the determination of the liquidity discount.

Table 3 shows the best model for estimating the liquidity discount, in terms of profiles A and B, is the restricted stock approach, while the best option for profile C is the comparable transactions approach. Studies of restricted stocks also have the advantage of highlighting how the liquidity discount is dependent on specific factors at the company in question.

Table 3. Compares the methodologies proposed in the literature to estimate the liquidity discount

	A) Degree to which the payoff is identical between the liquid and illiquid asset	**B) Effective comparability of the sales prices for the liquid asset and the illiquid asset**	**C) Time dispersion of determining prices**	**Score**
Restricted Stock Studies	+ + +	+ + +	+	+ + + + + + +
IPO Studies	+ +	+	+ +	+ + + + +
Comparable transactions	+	+ +	+ + +	+ + + + + +

5. Liquidity Discount Estimates in the Italian Market

The focus of this section is to find a measurement for the liquidity discount to apply to minority stakes in unlisted companies operating in Italy. Rather than adopt one of the discount methods covered above, it was decided to use a market approach - drawing on some aspects on the method used by *Koeplin, Sarin and Shapiro* - by asking what multiple a listed company would have if it were not listed. One of the fundamentals of this assessment draws on the evidence that liquidity is priced by the market, such that more liquid securities have higher multiples.

From 2003 to 2019, the Italian stock exchange was characterised by the presence of numerous listed companies with very low trading volumes. Grouping the listed companies into deciles based on stock market trading (turnover), the level of trading for the companies in the first decile is 2%, which is definitely comparable with unlisted companies (private companies). Since there is a direct relationship between the liquidity level (turnover) of shares and the stock exchange multiples (higher multiples mean more trading and visa-versa), as has been well-established in the literature, it is possible to deduce the liquidity discount based on the differential in the multiples for the most liquid securities (tenth decile) and the most illiquid securities (first decile), and then analyse the dynamics of this differential over time.

The sample of companies used here is all the Italian listed companies in the 17-year period from 2003 to 2019. The Price to Book Value multiple at 31 December of each year was calculated for each company, on the basis of its capitalisation and common equity. To measure the liquidity of different shares, the turnover indicator was used, corresponding to the number of shares traded in a specific period (in the case in hand in the last three months) relative to the total number of shares of a company. To have a way of measuring the discount for lack of liquidity two alternatives were used:

a) the Price to Book Value (P/BV) for companies with the greatest turnover was calculated and compared to the same measurement for those with the lowest turnover. In this case, the multiples were only calculated for companies in the first and tenth deciles for turnover. The discount was calculated using this formula:

$$\text{Liquidity Discount}_t = 1 - [(\text{Median Price to Book Value}_t \text{ for companies with low turnover}) / (\text{Median Price to Book Value}_t \text{ for companies with high turnover})]$$

b) the Price to Book Value for all Italian companies was regressed at the end of each year on the turnover indicator. In this case, all the companies were examined. When turnover is a statistically significant variable in the regression, the liquidity discount can be determined by the percentage difference between:

- the Price to Book Value multiple for an illiquid company obtained by using a turnover value of 0 in the regression;
- the Price to Book Value multiple for a liquid company, assuming turnover equal to the median of the companies in the tenth decile of the turnover frequency distribution (most liquid companies).

The two analyses are shown in detail below, along with the related results.

Comparison between the Price to Book Value multiple for companies with high and low turnover

The analysis involved the 305 listed Italian companies in each year in the ten-year period from 2003 to 2019. Turnover at three months and the P/BV multiple were calculated for each company. Then, all the companies were ordered according to turnover and then grouped into deciles. As such, the first deciles have the least liquid companies, while the final deciles have the greatest liquidity. The descriptive statistics for the deciles are presented in figure 1 and make it possible to compare:

- the median P/BV multiple for companies with high turnover, that is, those in the tenth decile for the frequency distribution of the turnover indicator for Italian listed companies;
- and the same multiple for companies with low turnover, that is, the companies in the first decile for the frequency distribution of the turnover indicator.

The result from the analysis in figure 1 and table 4 reveal the following:

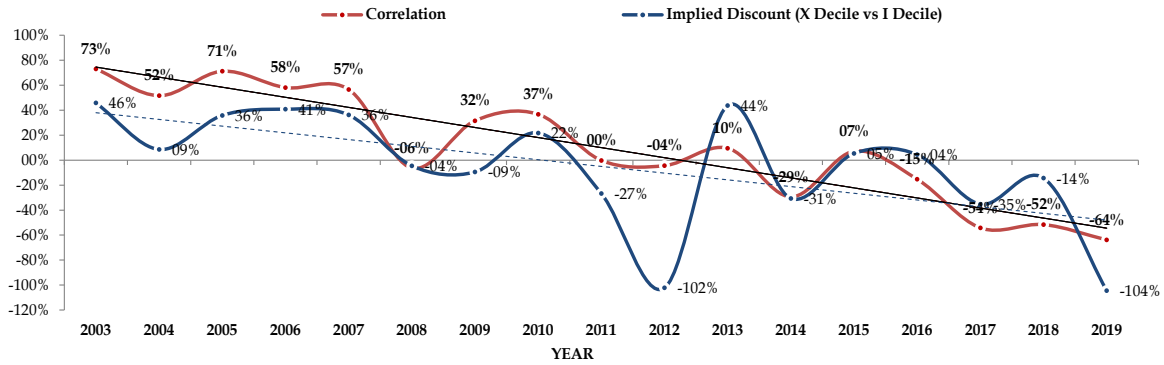
1. The companies with low turnover can basically be seen as the same as private companies. In this sense, the average turnover for companies in the first decile for 2003-2019 was basically zero (on average, 2%).
2. The correlation between the P/BV multiple and turnover varies significantly from year to year (called the time varying correlation). As such, for years such as 2006, 2007 and 2010, where the correlation is high, there are other years - 2008, 2009, 2011 and 2012 - in which the two measurements have no substantial correlation. This means that, as has been shown in the literature, liquidity is a determining factor in the price of a company only in some years, but in others it clearly is not.
3. Nonetheless, the correlation level does follow a long-term trend and tended to decrease during the ten-year period at an average annual rate of 8.3%. in 2012, there is no longer any relationship between the P/BV multiple and turnover.
4. Due to the increasingly small correlation over time, there is a significant, parallel reduction in the discount for lack of liquidity (calculated as shown above) between 2003 and 2019. The discount decreased in the ten-year period in question at an average annual rate of 4.2%.

Table 4. The liquidity discount and the correlation between liquidity of shares and the P/BV multiple in the seventy-year period from 2003-2019

	2003		2004		2005		2006		2007		2008	
	Turnover	P/BV	Turnover	P/BV	Turnover	P/BV	Turnover	P/BV	Turnover	P/BV	Turnover	P/BV
Decile 1	2,0%	1,29x	2,8%	1,76x	2,9%	1,38x	3,8%	1,29x	2,4%	1,32x	1,1%	1,07x
Decile 2	3,1%	1,41x	3,7%	1,14x	4,5%	1,49x	5,5%	1,89x	4,2%	1,52x	1,8%	0,85x
Decile 3	4,7%	1,52x	5,9%	1,89x	7,1%	1,67x	8,5%	1,93x	5,5%	1,73x	2,8%	1,61x
Decile 4	7,2%	1,41x	8,2%	1,48x	9,4%	1,82x	10,3%	1,96x	7,4%	1,72x	3,6%	0,79x
Decile 5	9,3%	1,96x	10,6%	1,65x	11,5%	1,82x	14,2%	1,91x	11,1%	2,21x	5,6%	0,85x
Decile 6	11,8%	1,43x	13,2%	1,49x	17,2%	1,86x	18,6%	2,53x	14,2%	1,73x	8,2%	0,73x
Decile 7	16,3%	1,01x	16,4%	1,90x	22,7%	1,43x	21,4%	2,27x	19,3%	2,23x	10,3%	1,23x
Decile 8	23,9%	1,49x	23,3%	1,91x	27,3%	2,14x	30,9%	2,38x	28,3%	2,05x	15,2%	0,95x
Decile 9	32,3%	2,08x	32,5%	2,40x	42,0%	2,29x	41,0%	2,61x	41,9%	2,27x	23,4%	0,89x
Decile 10	56,8%	2,38x	65,0%	1,93x	72,3%	2,16x	63,5%	2,19x	77,0%	2,08x	44,4%	1,03x
Median Whole Sample	**10,3%**	**1,47x**	**11,5%**	**1,63x**	**14,6%**	**1,79x**	**16,4%**	**2,00x**	**12,8%**	**1,92x**	**6,6%**	**0,94x**
Implied Discount - Decile 10 vs Decile 1		**45,8%**		**8,6%**		**35,9%**		**40,8%**		**36,2%**		**-4,5%**
Implied Discount - Median vs Decile 1		**34,2%**		**-7,1%**		**23,8%**		**32,1%**		**40,0%**		**-26,1%**
Correlation		**73,1%**		**51,6%**		**71,2%**		**58,1%**		**56,6%**		**-6,3%**

	2009		2010		2011		2012		2013		2014	
	Turnover	P/BV	Turnover	P/BV	Turnover	P/BV	Turnover	P/BV	Turnover	P/BV	Turnover	P/BV
Decile 1	1,0%	1,28x	5,4%	1,28x	0,5%	0,90x	0,5%	1,06x	1,7%	0,77x	0,7%	1,22x
Decile 2	2,2%	0,96x	29,1%	0,72x	1,0%	1,02x	1,4%	0,70x	4,2%	1,30x	3,4%	1,02x
Decile 3	3,9%	0,97x	28,0%	0,82x	2,1%	0,78x	2,4%	0,59x	7,1%	1,01x	5,7%	1,24x
Decile 4	5,6%	1,18x	30,8%	1,05x	3,6%	0,83x	3,3%	0,97x	10,3%	1,06x	7,2%	1,35x
Decile 5	8,6%	1,03x	40,7%	1,36x	5,8%	0,72x	4,8%	0,78x	14,0%	1,53x	9,1%	2,00x
Decile 6	12,1%	0,88x	58,9%	0,82x	8,3%	0,76x	6,7%	1,04x	18,6%	2,83x	13,5%	1,51x
Decile 7	16,1%	1,51x	64,7%	1,32x	10,9%	1,01x	11,1%	0,99x	24,2%	1,09x	19,0%	1,30x
Decile 8	22,0%	1,24x	59,5%	1,39x	21,3%	1,26x	16,3%	1,39x	29,3%	0,98x	28,2%	1,95x
Decile 9	30,1%	1,68x	73,6%	1,01x	30,1%	1,16x	28,1%	1,65x	40,4%	1,25x	37,6%	0,96x
Decile 10	61,5%	1,17x	80,8%	1,64x	63,6%	0,71x	61,3%	0,52x	76,4%	1,37x	68,5%	0,94x
Median Whole Sample	**10,1%**	**1,19x**	**8,9%**	**1,12x**	**7,1%**	**0,88x**	**5,5%**	**0,83x**	**15,7%**	**0,16x**	**10,2%**	**0,11x**
Implied Discount - Decile 10 vs Decile 1		**-9,4%**		**21,8%**		**-26,7%**		**-102,2%**		**43,7%**		**-30,6%**
Implied Discount - Median vs Decile 1		**-24,0%**		**6,0%**		**-26,1%**		**-36,2%**		**49,5%**		**38,9%**
Correlation		**31,6%**		**36,8%**		**-0,2%**		**-4,4%**		**9,6%**		**-29,4%**

	2015		2016		2017		2018		2019	
	Turnover	P/BV	Turnover	P/BV	Turnover	P/BV	Turnover	P/BV	Turnover	P/BV
Decile 1	1,0%	1,29x	0,9%	0,83x	1,5%	1,00x	1,1%	1,00x	4,6%	1,62x
Decile 2	3,2%	0,99x	2,9%	0,91x	4,1%	2,31x	2,4%	1,40x	14,4%	2,50x
Decile 3	4,8%	1,23x	3,9%	1,46x	6,2%	2,59x	4,4%	2,07x	23,3%	1,97x
Decile 4	7,6%	1,21x	5,5%	1,58x	10,1%	1,42x	6,2%	1,68x	35,6%	1,24x
Decile 5	10,1%	3,12x	8,8%	1,35x	12,7%	2,99x	8,6%	1,98x	46,5%	1,42x
Decile 6	13,6%	1,88x	14,5%	1,71x	15,3%	2,14x	11,8%	1,83x	61,6%	2,37x
Decile 7	19,4%	1,50x	18,5%	1,68x	18,9%	1,78x	15,0%	1,57x	81,9%	1,83x
Decile 8	27,6%	1,51x	24,4%	2,29x	24,5%	1,68x	18,9%	1,62x	100,4%	1,56x
Decile 9	34,5%	2,08x	34,8%	1,51x	35,6%	1,41x	24,0%	1,22x	139,7%	1,50x
Decile 10	58,4%	1,36x	87,5%	0,87x	68,2%	0,74x	47,8%	0,87x	280,6%	0,79x
Median Whole Sample	**11,1%**	**0,12x**	**10,9%**	**0,12x**	**13,8%**	**0,14x**	**10,1%**	**0,10x**	**53,9%**	**0,54x**
Implied Discount - Decile 10 vs Decile 1		**5,5%**		**4,5%**		**-35,2%**		**-14,4%**		**-104,5%**
Implied Discount - Median vs Decile 1		**58,8%**		**38,7%**		**66,6%**		**49,4%**		**-13,8%**
Correlation		**7,2%**		**-15,3%**		**-54,2%**		**-51,6%**		**-63,8%**



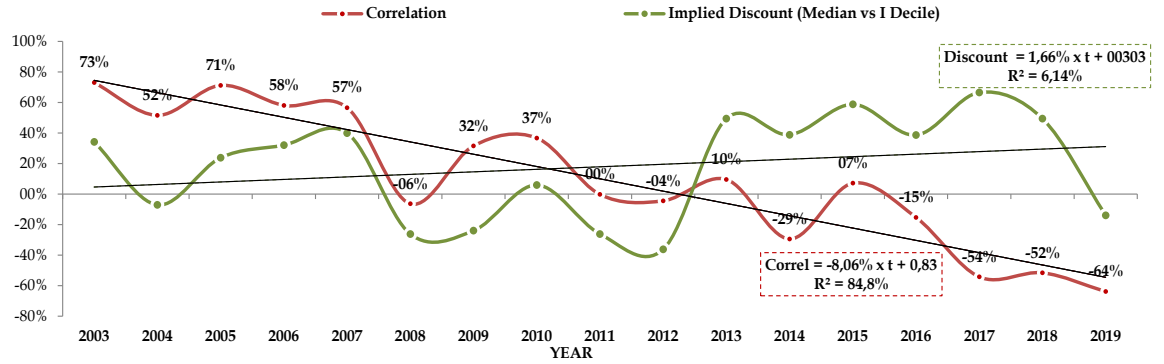


Figure 1. Trend for: i) the liquidity discount and ii) the correlation between liquidity of shares and the P/BV multiple in the seventy-year period from 2003-2019

Relationship between Price to Book Value and liquidity

The analysis comparing the first and tenth deciles indicated in the previous point (and showing that, in 2012, there was no relationship between stock market multiples and share liquidity) was completed with a regression analysis on the Price to Book Value multiple in relation to the turnover indicator. This additional analysis had two specific purposes: a) to verify the statistical significance, by examining the p-level coefficient, the slope of the regression (i.e. the turnover beta) and consequently the impact of liquidity on the formation of stock market prices regardless of which decile the company is in and b) to corroborate the discount measurements identified in the previous analysis. Where the regression coefficients are significant, it is possible to calculate the lack of liquidity implicit in a financial market as the percentage difference between: *i)* the P/BV multiple of an illiquid company (turnover equal to zero) and *ii*) the P/BV multiple of a liquid company with turnover equal to the median of the most liquid companies (top decile in the related frequency distribution). The formulas:

$$P/BV = \alpha + \beta \times Turnover$$

Once the regression coefficients α and β, and the median turnover are known, the liquidity discount can be calculated as follows:

$$\text{Discount for lack of liquidity} = 1 - [\alpha / (\alpha + \beta \times Turnover_{Median})]$$

To simplify the calculations, the analysis took advantage of the observations as per the 10 deciles indicated in table 1. Nonetheless, the same regression analysis was conducted on the entire sample of 305 listed Italian companies, obtaining the same results for the statistical significance of the turnover explanatory variable.

Figure 2 and table 5 provide a summary of the results in relation to:

1. The significance of the turnover variable;
2. The implicit liquidity discount in financial markets.

It shows that:

1. For 2003 to 2007, the turnover variable is statistically significant and the related coefficient is always positive around one. In other terms, there is a positive relationship between turnover and the P/BV multiple, with the companies with greater liquidity having a higher P/BV multiple. Therefore, liquidity during this historical period of time contributed significantly to the level of the stock exchange multiples.
2. Starting from 2008, the turnover variable lost statistical significance and the related coefficient became unstable (negative in 2008, 2012-2014, 2017-2019 and positive in 2009 – 2011, 2015-2016). This shows that, from 2008, the relationship between P/BV and turnover lost significance and, consequently, share liquidity did not help to explain the level of the P/BV multiple.
3. As a consequence of the observations in points 1 and 2, in 2003 to 2007, given the significance of the P/BV to turnover ratio, it is possible to calculate the liquidity discount, which is positive with a median value of 29.3%. By contrast, for 2008 to 2019, the liquidity discount *i)* loses economic significance (because of the drop in significance of the P/BV – turnover ratio) and *ii)* effectively becomes zero (median equals -5.4%).

In short, both the analysis using the deciles and the regression analysis show the liquidity discount varies over time.

6. Conclusions

The analysis conducted made it possible to verify:

a) the existence for the Italian market of a discount for lack of liquidity for shares with less turnover;

b) the variability over time of that discount, thus agreeing with the literature that has found the premiums for liquidity risk vary over time.

The discounts that were found are, nonetheless, smaller than those indicated in the literature. The descending trend over time for the discount would seem to be particularly consistent with the studies on restricted stocks.

Table 5 Trends for: i) the significance of the P/BV ratio compared to Turnover and ii) the liquidity discount for the ten-year period from 2003-2019

	2003	2004	2005	2006	2007	2008	2009	2010	2011	Median 2003-2007
Coefficient										
Intercept (a)	*1,30x*	*1,59x*	*1,58x*	*1,84x*	*1,72x*	*1,01x*	*1,12x*	*0,92x*	*0,91x*	*1,59x*
Turnover (b)	*1,77x*	*0,94x*	*1,06x*	*1,20x*	*0,80x*	*-0,12x*	*0,43x*	*0,46x*	*0,00x*	*1,06x*
Significance (p-level) of turnover variable	**1,6%**	**12,6%**	**2,1%**	**7,8%**	**8,8%**	**86,2%**	**37,4%**	**29,6%**	**99,6%**	*0,08x*
Tenth Decile Turnover (c)	56,8%	65,0%	72,3%	63,5%	77,0%	44,4%	61,5%	80,8%	63,6%	*0,65x*
Impied P/BV Tenth decile Turnover (d=a+b*c)	2,31x	2,19x	2,34x	2,60x	2,33x	0,96x	1,39x	1,30x	0,91x	*2,33x*
Discount for lack of liquidity (e=d-a)	**43,5%**	**27,7%**	**32,7%**	**29,3%**	**26,3%**	**-5,7%**	**19,2%**	**28,7%**	**-0,1%**	**29,3%**

	2012	2013	2014	2015	2016	2017	2018	2019	Median 2008-2019
Coefficient									
Intercept (a)	*0,98x*	*1,81x*	*1,84x*	*1,96x*	*1,71x*	*2,70x*	*2,14x*	*2,32x*	*1,81x*
Turnover (b)	*-0,08x*	*-0,44x*	*-0,24x*	*0,62x*	*1,26x*	*-1,46x*	*-1,22x*	*-0,23x*	*-0,08x*
Significance (p-level) of turnover variable	**90,4%**	**62,8%**	**78,3%**	**60,6%**	**11,5%**	**29,6%**	**37,8%**	**34,3%**	**37,8%**
Tenth Decile Turnover (c)	61,3%	68,5%	68,5%	58,4%	87,5%	68,2%	47,8%	280,6%	68,2%
Impied P/BV Tenth decile Turnover (d=a+b*c)	0,93x	1,51x	1,68x	2,33x	2,82x	1,70x	1,56x	1,66x	1,56x
Discount for lack of liquidity (e=d-a)	**-5,4%**	**-19,9%**	**-9,8%**	**15,6%**	**39,1%**	**-58,2%**	**-37,5%**	**-39,5%**	**-5,4%**

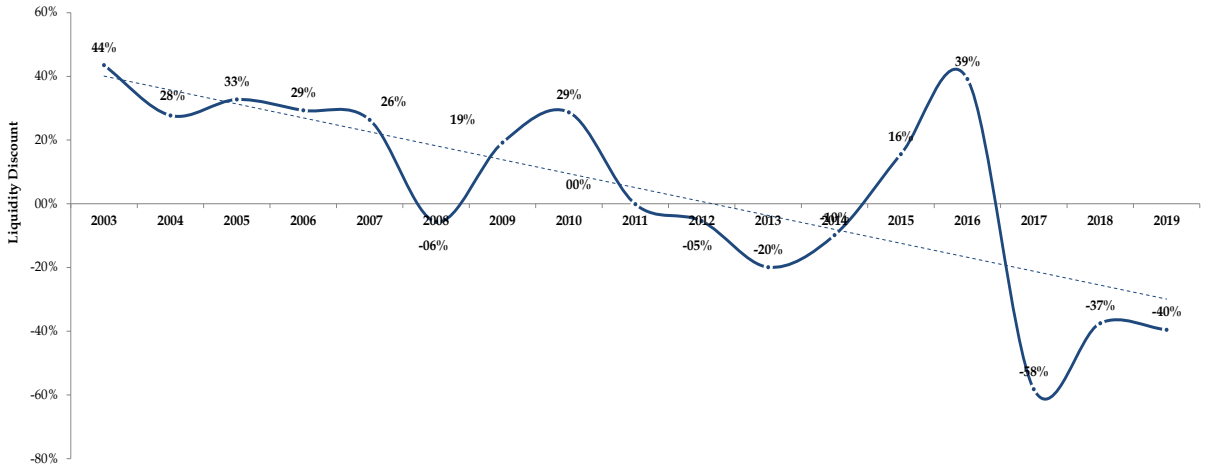


Figure 2. Trends for: i) the significance of the P/BV ratio compared to Turnover and ii) the liquidity discount for the ten-year period from 2003-2019

Table 6. Summary of i) the analysis using deciles and ii) the regression analysis

2003	Turnover	P to BV
Decile 1	2,0%	1,29x
Decile 2	3,1%	1,41x
Decile 3	4,7%	1,52x
Decile 4	7,2%	1,41x
Decile 5	9,3%	1,96x
Decile 6	11,8%	1,43x
Decile 7	16,3%	1,01x
Decile 8	23,9%	1,49x
Decile 9	32,3%	2,08x
Decile 10	56,8%	2,38x
Implicit discount - Decile 10 vs Decile 1		**45,8%**
Correlation		**73,1%**

Regression analysis - P/BV vs Turnover

2003	Value
Multiple R	73,1%
Multiple R ²	53,4%
Adjusted R ²	47,6%
F(1,104)	9,17
p	0,02
Std.Err. of Estimate	0,30

	Coeff.	Std.Err.	t(104)	p-level
Intercept	1,30	0,14	9,59	0,0%
Turnover	**1,77**	**0,58**	**3,03**	**1,6%**
Liquidity discount				**43,5%**

2004	Turnover	P to BV
Decile 1	2,8%	1,76x
Decile 2	3,7%	1,14x
Decile 3	5,9%	1,89x
Decile 4	8,2%	1,48x
Decile 5	10,6%	1,65x
Decile 6	13,2%	1,49x
Decile 7	16,4%	1,90x
Decile 8	23,3%	1,91x
Decile 9	32,5%	2,40x
Decile 10	65,0%	1,93x
Implicit discount - Decile 10 vs Decile 1		**8,6%**
Correlation		**51,6%**

Regression analysis - P/BV vs Turnover

2004	Value
Multiple R	51,6%
Multiple R ²	26,7%
Adjusted R ²	17,5%
F(1,118)	2,91
p	0,13
Std.Err. of Estimate	0,17

	Coeff.	Std.Err.	t(118)	p-level
Intercept	1,59	0,14	11,33	0,0%
Turnover	**0,94**	**0,55**	**1,71**	**12,6%**
Liquidity discount				**27,7%**

2005	Turnover	P to BV
Decile 1	2,9%	1,38x
Decile 2	4,5%	1,49x
Decile 3	7,1%	1,67x
Decile 4	9,4%	1,82x
Decile 5	11,5%	1,82x
Decile 6	17,2%	1,86x
Decile 7	22,7%	1,43x
Decile 8	27,3%	2,14x
Decile 9	42,0%	2,29x
Decile 10	72,3%	2,16x
Implicit discount - Decile 10 vs Decile 1		**35,9%**
Correlation		**71,2%**

Regression analysis - P/BV vs Turnover

2005	Value
Multiple R	71,2%
Multiple R ²	50,7%
Adjusted R ²	44,6%
F(1,133)	8,24
p	0,02
Std.Err. of Estimate	0,16

	Coeff.	Std.Err.	t(133)	p-level
Intercept	1,58	0,11	14,34	0,0%
Turnover	**1,06**	**0,37**	**2,87**	**2,1%**
Liquidity discount				**32,7%**

2006	Turnover	P to BV
Decile 1	3,8%	1,29x
Decile 2	5,5%	1,89x
Decile 3	8,5%	1,93x
Decile 4	10,3%	1,96x
Decile 5	14,2%	1,91x
Decile 6	18,6%	2,53x
Decile 7	21,4%	2,27x
Decile 8	30,9%	2,38x
Decile 9	41,0%	2,61x
Decile 10	63,5%	2,19x
Implicit discount - Decile 10 vs Decile 1		**40,8%**
Correlation		**58,1%**

Regression analysis - P/BV vs Turnover

2006	Value
Multiple R	58,1%
Multiple R ²	33,8%
Adjusted R ²	25,5%
F(1,149)	4,08
p	0,08
Std.Err. of Estimate	0,16

	B	Std.Err.	t(149)	p-level
Intercept	1,84	0,17	11,00	0,0%
Turnover	**1,20**	**0,59**	**2,02**	**7,8%**
Liquidity discount				**29,3%**

2007	Turnover	P to BV
Decile 1	2,4%	1,32x
Decile 2	4,2%	1,52x
Decile 3	5,5%	1,73x
Decile 4	7,4%	1,72x
Decile 5	11,1%	2,21x
Decile 6	14,2%	1,73x
Decile 7	19,3%	2,23x
Decile 8	28,3%	2,05x
Decile 9	41,9%	2,27x
Decile 10	77,0%	2,08x
Implicit discount - Decile 10 vs Decile 1		**36,2%**
Correlation		**56,6%**

Regression analysis - P/BV vs Turnover

2007	Value
Multiple R	56,6%
Multiple R ²	32,1%
Adjusted R ²	23,6%
F(1,160)	3,78
p	0,09
Std.Err. of Estimate	0,20

	Coeff.	Std.Err.	t(160)	p-level
Intercept	1,72	0,13	13,73	0,0%
Turnover	**0,80**	**0,41**	**1,94**	**8,8%**
Liquidity discount				**26,3%**

Analysis per decile - Trend for P/BV multiple as turnover increases

2008	Turnover	P to BV
Decile 1	1,1%	1,07x
Decile 2	1,8%	0,85x
Decile 3	2,8%	1,61x
Decile 4	3,6%	0,79x
Decile 5	5,6%	0,85x
Decile 6	8,2%	0,73x
Decile 7	10,3%	1,23x
Decile 8	15,2%	0,95x
Decile 9	23,4%	0,89x
Decile 10	44,4%	1,03x
Implicit discount - Decile 10 vs Decile 1		**-4,5%**
Correlation		**-6,3%**

Regression analysis - P/BV vs Turnover

2008	Value
Multiple R	6,3%
Multiple R ²	0,4%
Adjusted R ²	-12,0%
F(1,169)	0,03
p	0,86
Std.Err. of Estimate	0,14

	Coeff.	Std.Err.	t(169)	p-level
Intercept	1,01	0,12	8,61	0,0%
Turnover	**-0,12**	**0,68**	**-0,18**	**86,2%**
Liquidity discount				**-5,7%**

2009	Turnover	P to BV
Decile 1	1,0%	1,28x
Decile 2	2,2%	0,96x
Decile 3	3,9%	0,97x
Decile 4	5,6%	1,18x
Decile 5	8,6%	1,03x
Decile 6	12,1%	0,88x
Decile 7	16,1%	1,51x
Decile 8	22,0%	1,24x
Decile 9	30,1%	1,68x
Decile 10	61,5%	1,17x
Implicit discount - Decile 10 vs Decile 1		-9,4%
Correlation		31,6%

Regression analysis - P/BV vs Turnover

2009	Value
Multiple R	31,6%
Multiple R ²	10,0%
Adjusted R ²	-1,3%
F(1,174)	0,89
p	0,37
Std.Err. of Estimate	0,18

	Coeff.	Std.Err.	t(174)	p-level
Intercept	1,12	0,11	10,20	0,0%
Turnover	**0,43**	**0,46**	**0,94**	**37,4%**
Liquidity discount				**19,2%**

2010	Turnover	P to BV
Decile 1	5,4%	1,28x
Decile 2	29,1%	0,72x
Decile 3	28,0%	0,82x
Decile 4	30,8%	1,05x
Decile 5	40,7%	1,36x
Decile 6	58,9%	0,82x
Decile 7	64,7%	1,32x
Decile 8	59,5%	1,39x
Decile 9	73,6%	1,01x
Decile 10	80,8%	1,64x
Implicit discount - Decile 10 vs Decile 1		21,8%
Correlation		36,8%

Regression analysis - P/BV vs Turnover

2010	Value
Multiple R	36,8%
Multiple R ²	13,5%
Adjusted R ²	2,7%
F(1,178)	1,25
p	0,30
Std.Err. of Estimate	0,24

	Coeff.	Std.Err.	t(178)	p-level
Intercept	0,92	0,22	4,28	0,3%
Turnover	**0,46**	**0,41**	**1,12**	**29,6%**
Liquidity discount				**28,7%**

2011	Turnover	P to BV
Decile 1	0,5%	0,90x
Decile 2	1,0%	1,02x
Decile 3	2,1%	0,78x
Decile 4	3,6%	0,83x
Decile 5	5,8%	0,72x
Decile 6	8,3%	0,76x
Decile 7	10,9%	1,01x
Decile 8	21,3%	1,26x
Decile 9	30,1%	1,16x
Decile 10	63,6%	0,71x
Implicit discount - Decile 10 vs Decile 1		-26,7%
Correlation		-0,2%

Regression analysis - P/BV vs Turnover

2011	Value
Multiple R	0,2%
Multiple R ²	0,0%
Adjusted R ²	-12,5%
F(1,176)	0,00
p	1,00
Std.Err. of Estimate	0,21

	Coeff.	Std.Err.	t(176)	p-level
Intercept	0,91	0,08	11,26	0,0%
Turnover	**0,00**	**0,34**	**-0,01**	**99,6%**
Liquidity discount				**-0,1%**

2012	Turnover	P to BV
Decile 1	0,5%	1,06x
Decile 2	1,4%	0,70x
Decile 3	2,4%	0,59x
Decile 4	3,3%	0,97x
Decile 5	4,8%	0,78x
Decile 6	6,7%	1,04x
Decile 7	11,1%	0,99x
Decile 8	16,3%	1,39x
Decile 9	28,1%	1,65x
Decile 10	61,3%	0,52x
Implicit discount - Decile 10 vs Decile 1		**-102,2%**
Correlation		**-4,4%**

Regression analysis - P/BV vs Turnover

2012	Value
Multiple R	4,4%
Multiple R ²	0,2%
Adjusted R ²	-12,3%
F(1,178)	0,02
p	0,90
Std.Err. of Estimate	0,20

	Coeff.	Std.Err.	t(178)	p-level
Intercept	0,98	0,15	6,62	0,0%
Turnover	**-0,08**	**0,66**	**-0,12**	**90,4%**
Liquidity discount				**-5,4%**

2013	Turnover	P to BV
Decile 1	1,7%	0,77x
Decile 2	4,2%	1,30x
Decile 3	7,1%	1,01x
Decile 4	10,3%	1,06x
Decile 5	14,0%	1,53x
Decile 6	18,6%	2,83x
Decile 7	24,2%	1,09x
Decile 8	29,3%	0,98x
Decile 9	40,4%	1,25x
Decile 10	76,4%	1,37x
Implicit discount - Decile 10 vs Decile 1		**43,7%**
Correlation		**9,6%**

Regression analysis - P/BV vs Turnover

2013	Value
Multiple R	5,1%
Multiple R ²	0,3%
Adjusted R ²	-0,8%
F(1,91)	0,24
p	0,63
Std.Err. of Estimate	1,37

	Coeff.	Std.Err.	t(91)	p-level
Intercept	1,81	0,23	7,80	0,0%
Turnover	**-0,44**	**0,90**	**-0,49**	**62,8%**
Liquidity discount				**0,0%**

2014	Turnover	P to BV
Decile 1	0,7%	1,22x
Decile 2	3,4%	1,02x
Decile 3	5,7%	1,24x
Decile 4	7,2%	1,35x
Decile 5	9,1%	2,00x
Decile 6	13,5%	1,51x
Decile 7	19,0%	1,30x
Decile 8	28,2%	1,95x
Decile 9	37,6%	0,96x
Decile 10	68,5%	0,94x
Implicit discount - Decile 10 vs Decile 1		**-30,6%**
Correlation		**-29,4%**

Regression analysis - P/BV vs Turnover

2014	Value
Multiple R	2,8%
Multiple R ²	0,1%
Adjusted R ²	-1,0%
F(1,97)	0,08
p	0,78
Std.Err. of Estimate	1,39

	Coeff.	Std.Err.	t(97)	p-level
Intercept	1,84	0,21	8,73	0,0%
Turnover	**-0,24**	**0,87**	**-0,28**	**78,3%**
Liquidity discount				**0,0%**

2015	Turnover	P to BV
Decile 1	1,0%	1,29x
Decile 2	3,2%	0,99x
Decile 3	4,8%	1,23x
Decile 4	7,6%	1,21x
Decile 5	10,1%	3,12x
Decile 6	13,6%	1,88x
Decile 7	19,4%	1,50x
Decile 8	27,6%	1,51x
Decile 9	34,5%	2,08x
Decile 10	58,4%	1,36x
Implicit discount - Decile 10 vs Decile 1		**5,5%**
Correlation		**7,2%**

Regression analysis - P/BV vs Turnover

2015	Value
Multiple R	5,2%
Multiple R ²	0,3%
Adjusted R ²	-0,7%
F(1,99)	0,27
p	0,61
Std.Err. of Estimate	1,50

	Coeff.	Std.Err.	t(99)	p-level
Intercept	1,96	0,25	7,99	0,0%
Turnover	**0,62**	**1,20**	**0,52**	**60,6%**

Liquidity discount	**0,0%**

2016	Turnover	P to BV
Decile 1	0,9%	0,83x
Decile 2	2,9%	0,91x
Decile 3	3,9%	1,46x
Decile 4	5,5%	1,58x
Decile 5	8,8%	1,35x
Decile 6	14,5%	1,71x
Decile 7	18,5%	1,68x
Decile 8	24,4%	2,29x
Decile 9	34,8%	1,51x
Decile 10	87,5%	0,87x
Implicit discount - Decile 10 vs Decile 1		**4,5%**
Correlation		**-15,3%**

2016	Value
Multiple R	15,0%
Multiple R ²	2,3%
Adjusted R ²	1,4%
F(1,109)	2,52
p	0,12
Std.Err. of Estimate	1,36

	Coeff.	Std.Err.	t(109)	p-level
Intercept	1,71	0,18	9,34	0,0%
Turnover	**1,26**	**0,79**	**1,59**	**11,5%**

Liquidity discount	**0,0%**

2017	Turnover	P to BV
Decile 1	1,5%	1,00x
Decile 2	4,1%	2,31x
Decile 3	6,2%	2,59x
Decile 4	10,1%	1,42x
Decile 5	12,7%	2,99x
Decile 6	15,3%	2,14x
Decile 7	18,9%	1,78x
Decile 8	24,5%	1,68x
Decile 9	35,6%	1,41x
Decile 10	68,2%	0,74x
Implicit discount - Decile 10 vs Decile 1		**-35,2%**
Correlation		**-54,2%**

2017	Value
Multiple R	9,6%
Multiple R ²	0,9%
Adjusted R ²	0,1%
F(1,119)	1,10
p	0,30
Std.Err. of Estimate	1,72

	Coeff.	Std.Err.	t(119)	p-level
Intercept	2,70	0,27	9,83	0,0%
Turnover	**-1,46**	**1,39**	**-1,05**	**29,6%**

Liquidity discount	**0,0%**

2018	Turnover	P to BV
Decile 1	1,1%	1,00x
Decile 2	2,4%	1,40x
Decile 3	4,4%	2,07x
Decile 4	6,2%	1,68x
Decile 5	8,6%	1,98x
Decile 6	11,8%	1,83x
Decile 7	15,0%	1,57x
Decile 8	18,9%	1,62x
Decile 9	24,0%	1,22x
Decile 10	47,8%	0,87x
Implicit discount - Decile 10 vs Decile 1		**-14,4%**
Correlation		**-51,6%**

2018	Value
Multiple R	7,9%
Multiple R ²	0,6%
Adjusted R ²	-0,2%
F(1,123)	0,78
p	0,38
Std.Err. of Estimate	1,55

	Coeff.	Std.Err.	t(123)	p-level
Intercept	2,14	0,22	9,56	0,0%
Turnover	**-1,22**	**1,38**	**-0,88**	**37,8%**

Liquidity discount	**0,0%**

2019	Turnover	P to BV
Decile 1	4,6%	1,62x
Decile 2	14,4%	2,50x
Decile 3	23,3%	1,97x
Decile 4	35,6%	1,24x
Decile 5	46,5%	1,42x
Decile 6	61,6%	2,37x
Decile 7	81,9%	1,83x
Decile 8	100,4%	1,56x
Decile 9	139,7%	1,50x
Decile 10	280,6%	0,79x
Implicit discount - Decile 10 vs Decile 1		**-104,5%**
Correlation		**-63,8%**

2019	Value
Multiple R	8,3%
Multiple R ²	0,7%
Adjusted R ²	-0,1%
F(1,130)	0,91
p	0,34
Std.Err. of Estimate	1,54

	Coeff.	Std.Err.	t(130)	p-level
Intercept	2,32	0,22	10,76	0,0%
Turnover	**-0,23**	**0,25**	**-0,95**	**34,3%**

Liquidity discount	**0,0%**

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