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# How to Evaluate the Performance of the Taiwan Biotech and Biopharmaceutical Corporations?

Tzu-Chun Sheng[1]

[1] Department of Finance, Ling Tung University, Taiwan, R. O. C.

Correspondence: Tzu-Chun Sheng, Department of Finance, Ling Tung University, Taichung City, Taiwan, R. O. C. Tel: 886-989-997-776. E-mail: morgan1125@teamail.ltu.edu.tw

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**Abstract**

Modern biotechnology and pharmaceutical industry, the most developmental mainstream, has been generally acknowledged in the 21st century. The approach of this study surmounted the traditional DEA and SFA, combining with modified Delphi approach, ISM, FANP and performance evaluation table to build evaluation mode of operating performance precisely and completely in Taiwan biotech and pharmaceutical corporations. Considering 4 criteria and 18 sub-criteria complied to evaluate the operating performance in the enterprise. The analyzed result appeared, the significance of criteria is "Product and technology R&D", "Financial performance", "Production and quality management" and "Organization characteristics and operation management" in sequence. The top 5 key sub-criteria influence the evaluation of operating performance in Taiwan biotech and pharmaceutical corporations are "Profitability", "Efficiency of production and cost", "Innovative products and R&D strategies", "Quality management and cost control" and "Operation strategy and business mode". The last 5 key sub-criteria are "Human resources management", "Project management", "Innovation of process technology", "Competence of financial operation" and "Market share". Finally, the top 10 of conglomerate revenue in listed companies taken as the sample of empirical research on this study. According to the experts' evaluation, the total point of weighted average is 58.9020 of whole sample in complete period in all enterprises, which fell at the grade of 'Slightly good' as a whole. The related results accord with the real situation in the industry. The result of this study is able to be a significant basis as the policies drawn up by government, operating performance evaluated by the enterprise and investment target measured by the investors.

**Keywords:** corporation performance evaluation, fuzzy analytic network process, interpretive structural model, modified Delphi approach, performance evaluation table, Taiwan biotech and biopharmaceutical industry

## 1. Introduction

Modern biotechnology and pharmaceutical industry have combined with the multi-cross-fields such as the molecular biology, microbiology, gene engineering, electrical engineering, the mechanical engineering and so on as the research results in twenty years recently. Originally, the extensive application of biotechnology is so as to provide stable food supply in human society as well as enhance people's quality of life. With the constant breakthrough, biotechnology has been extensively applied to a plenty of industries as the research and development of pharmaceuticals, health care medicine, environmental protection, food science and technology, material science and the explosion of new energies…etc. New founded corporations of biotechnology and pharmaceuticals, for example, Amgen, Biogen, Genentech, and Hybritech, redesigned and composed the products with gene proteins as the research objective to initiate the new aspect of modern biological science and technology and pharmaceutical industry in the early of 80's. Human genome project (HGP) was facilitated to complete the drawing of human genome map by the USA and the UK in 2003. The science field strode a big step forward the interpretation and analysis of biology and gene from then on.

Currently, the governments in most of advanced countries value the investments and developments in biology technology and pharmaceutical industry with prudent attitude. Furthermore, these governments invest huge resources in such emerging industry to bring in enormous profits. Consequently, biotech and biopharmaceutical industry are not only generally acknowledged as the mainstream with a highly potential in the 21st century, but the industry of facilitating the quality of life for humankind. A number of global nations incorporate the industry of biotechnology with national key industry as future developed project, founding the policies as centralized

resources, positive investments and advanced developments. The rate has gone up 8.7%, compared the US$79.73 billion in 2013 with US$73.34 billion in 2012, in light of statistics by BioCentury. In 2013, 59 biotechnology corporations issued initial public offering (IPO) successfully, which is more 34 corporations than 2012, hit the high record recently. Besides, the market of biotechnology pharmaceutical is the most high-profile industry of all. The research report indicated the growth rate of global medicine market will be up to 5~7% in 2017 from 2~3% in 2017 by IMS Health. The global market scale of medicine will reach to US$1.2 trillion as well as the compound annual growth rate (CAGR) is approximately 5.3%.

The definition and scope of biotechnology among different governments and institutions has dissimilar views. Convention on Biological Diversity (CBD) defined 'Biotechnology' as any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use. Organization for Economic Cooperation and Development (OECD) clarified the application of science and technology to living organisms as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services, which differentiates from the development of conventional biology, moreover, the development of biotech and biopharmaceutical industry focuses on the disciplines as proteomics, comparative genomics, pharmacogenomics, metabolomics, translational medicine, bioinformatics, systems biology, synthetic biology and so on.

Taiwanese government initiated to implement a series of policies and bills in order to construct an excellent investing environment for biotechnological industry in 1980. Therefore, Taiwanese government also successively promulgated Action Plan for Biotechnology Industry, Taiwan Diamond Action Plan for Biotech Takeoff and Development Program of Industrialization for Agricultural Biotechnology. In 2013, Taiwan Biotechnology Industrialization Take-off Action Plan was approved and verified to facilitate the medicine, medical equipment and health care management service to fulfill the industrialized development, making successful cases continuously. As Figure 1 indicated, Taiwanese government split biotech and biopharmaceutical industry into three sectors: Applied biotechnology sector, pharmaceutical sector and medical device sector. These endeavors were struggled to reinforce the infrastructure of biopharmaceutical Industry, provide a well-developed environment, strengthen industrialized functions and accelerate the biopharmaceutical industry to the mainstream in the future by Taiwanese government.

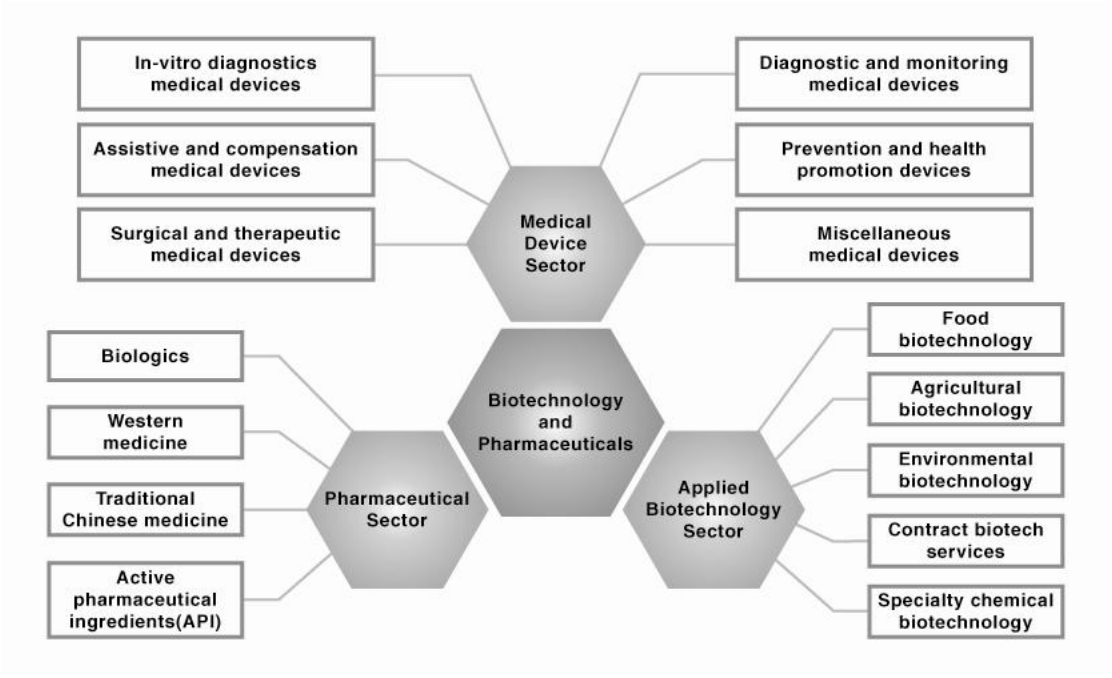


Figure 1. Taiwan biotech and biopharmaceutical industry sectors

After going through years of efforts among Taiwanese government, academia and industrial circle, the value of production among Taiwanese biotech, pharmaceutical industry and three big fields has been shown as the

successive growth for 12 years from 2002 through 2013. Up to 2013, the revenue of integral biotech industry has excessed US$9.3 million, the growth rate of which increased 5%, compared with 2013. The number of manufactures of biotech came to 1601 in 2012, the numbers of listed companies of at stock exchange market and at over-the counter market of which reached 83 incorporations with 71 580 employees. In addition, the industry value of import and export has been increasing continuously. As Table 1 indicated the statistical figures of scale among Taiwanese biotech and biopharmaceutical industry and three fields, revenue, the value of import and export and market demands from 2011 to 2013.

Table 1. 2011-2013 Status of Taiwan's biotechnology and pharmaceutical industries

| Industry Type | Applied Biotechnology | | | Pharmaceuticals | | | Medical Device | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 2011 | 2012 | 2013 | 2011 | 2012 | 2013 | 2011 | 2012 | 2013 | 2011 | 2012 | 2013 |
| Revenues | 2186 | 2492 | 2627 | 2408 | 2701 | 2768 | 3235 | 3687 | 3927 | 7829 | 8881 | 9301 |
| No. of companies | 402 | 450 | 490 | 400 | 350 | 350 | 626 | 705 | 761 | 1428 | 1505 | 1601 |
| Personnel | 15 780 | 16 770 | 17 540 | 19 332 | 18 500 | 19 000 | 30 250 | 34 200 | 35 040 | 65 362 | 69 470 | 71 580 |
| Export value | 880 | 952 | 1004 | 518 | 655 | 658 | 1336 | 1553 | 1626 | 2740 | 3161 | 3289 |
| Import value | 1424 | 1621 | 1884 | 2792 | 3319 | 3332 | 1792 | 1932 | 2032 | 6011 | 6872 | 7027 |
| Import export | 60:40 | 62:38 | 62:38 | 78:22 | 76:24 | 76:24 | 59:41 | 58:42 | 58:42 | 65:35 | 64:36 | 65:35 |
| Domestic market demand | 2730 | 3161 | 3285 | 4682 | 5366 | 5442 | 3691 | 4066 | 4313 | 11 100 | 12 592 | 13 040 |

*Note.* Unit: US$ million.

Biotech and biopharmaceutical industry in Taiwan got a later start than advanced countries worldwide, most of which are small and medium enterprises. Sheng (2009), Yang, Sheng, and Huang (2010), Sheng, Liu, and Yang (2012) and Chen, Sheng, and Yang (2015) claimed biotech and biopharmaceutical corporations in Taiwan possess high proportion of research and development, long period of research and development, barriers to entry of high-tech industries and high-priced expense on research and development. Meanwhile, biotech and biopharmaceutical corporations require to value the channel and marketing and to emphasize the management of patent right and intellectual property right as well, implying the integral competitive environment without excessive funds and resources to lavish. Most of biotech and biopharmaceutical corporations in Taiwan also encounter the technique development, resources distribution, efficiency enhancement and reward on investment. As a result, how to precisely evaluate the performance with scientificization and datumization is becoming a new issue (Chiu, Hu, & Tsao, 2003; Hsieh, Wann, & Lu, 2007; Sheng, 2009; Yang et al., 2010; Sheng et al., 2012; Chen, Sheng, & Yang, 2014; Chen et al., 2015).

The methods of evaluating performance researchers frequented to adopt in the past, including balanced score card (BSC), data envelopment analysis (DEA), stochastic frontier analysis (SFA), analytic hierarchy process (AHP), financial ratio analysis (FRA) and multivariate statistical analysis. The researchers concentrated on DEA of nonparametric methods and SFA of parametric methods for the relative research of biotech and biopharmaceutical corporations in Taiwan in the past. The research issues focused on the empirical analysis of cost efficiency, technical efficiency, financial performance, R&D performance of manufactures. Of all the studies, Chen, Hu, and Ding (2005), Chiu, Chen, and Tsao (2005), Hsieh et al. (2007), Liang, Jiang, and Lai (2008), Yang et al. (2010) and Sheng et al. (2012) are the most noticeable, these literature reviews of which adopted DEA as the research approach, as well as Chiu et al. (2003), Yeh, Chen, and Chen (2007), Li and Li (2008), Sheng (2009), Li, Wu, and Li (2011) and Chen et al. (2014) adopted SFA. The literature reviews mentioned above without consistent conclusion. In other words, the researchers adopted different research methods or different performance evaluation might cause diverse empirical results and conclusions. The coverage of biotech and biopharmaceutical industry is so wide that the difference between individual manufactures might result in various possibilities of errors of performance evaluation as well. Accordingly, the researchers require taking these influential factors as regard to seek solutions in order to evaluate the performance precisely in biotech and biopharmaceutical industry in Taiwan. Besides, the relevant studies of performance for biotech and biopharmaceutical industry over-relied on DEA and SFA as methodology in the past, so Wu, Chang, and Lin (2008) and Sheng (2009) proclaimed these traditional methods of performance evaluation which were unable to appear the integral aspect of enterprise operation completely is the biggest limitation. The main reason is the operation variable of enterprise lessened evaluated by these methods. In the view of this, this study attempts to break traditional research limitations, proposing an innovative thinking and approach to precisely evaluate the

performance for biotech and biopharmaceutical corporations completely in Taiwan.

The purpose of this study set up the evaluation mode of performance for biotech and biopharmaceutical corporations in Taiwan, which differentiated from the former studies. Modified Delphi approach was adopted to cope with collection of expert's questionnaire and evaluation criteria arranged by researchers while evaluating enterprise performance on this study. Furthermore, interpretive structural model (ISM) was adopted to analyze the association between these evaluation criteria and build up structure model. Then, fuzzy analytic network process (FANP) was analyzed to obtain the weight and criteria and sub-criteria. Finally, take top 10 biotech and biopharmaceutical corporations with market value as the research examples, in light of performance evaluation table as the result designed by FANP to evaluate the performance of manufactures. The research which process and empirical result are able to supply the insufficient former relevant literature reviews is an important reference for future study. On this study, the first chapter is the introduction, accounting for the development background, research motivation, purpose and research frame. The second chapter is literature review aiming at the elements of performance evaluation as financial performance, products and technology of R&D, production and quality management, organization characteristics and operation management discussed individually. Methodology is as the third chapter, clarifying the methods adopted as modified Delphi approach, ISM, FANP and performance evaluation table. Chapter four is empirical result and analysis. The fifth chapter is conclusion.

## 2. Literature Review

The former relevant research results regarding performance have been extensively drawn on respective industry. Venkatraman and Ramanujam (1986), Kaplan and Norton (1996) and Van der Stede, Chow, and Lin (2006) emphasized the performance evaluation indicator of organization is able to connect with strategy. With regard of research issues of biotech and biopharmaceutical industry performance were showed in the literatures. The relevant literatures will be reviewed initially so as to build the performance evaluation indicator and evaluation mode effectively. Regarding comprehensive issues of performance evaluation researches, corporation evaluation will be affected by four factors: financial performance, product and R&D technology, production and quality management and organization characteristics and operation management on this study.

### *2.1 Financial Performance*

One of the purposes for enterprise operation and production is to make fortune, earn profits and enhance market value of enterprise. The researchers are merely unable to count on traditional financial indicator to evaluate the performance for these corporations due to the specific attribute of biotech and biopharmaceutical industry. Nevertheless, financial performance is still a key indicator performance to evaluate the enterprise operation. The former related literatures attempted to probe into enterprise financial performance with different angles and issues. Most of the financial performances are related to the financial operation, investments, stock price and profits in the enterprise. Eliasson (1976) assumed the enterprise started to plan integral operational policies from revenue in general. The growth of revenue is able to provide useful and distinct benchmark to encourage employees to attain the goals. Kaplan and Norton (1996) declared the financial statement is the key performance indicator in the enterprise. According to Aaker (1998), sustainable competitive advantage (SCA) possesses significant effect on enterprise performance. Sustainable competitive advantage incorporates the economy of scale, low-cost manpower or manufacturing automation to reduce the cost, which enables the enterprise to retain the advantage of low-cost in finance.

Ramezani, Soenen, and Jung (2002) stated the enterprise operation performance would be influenced by operating growth rate on the ground that the corporation revenue was from operating revenue. Operating revenue growth is not only the embodiment, but the operating growth is able to draw on the funds effectively, profitable revenue and profitable revenue growth, defined by Charan (2004). Enterprise operation performance incurred the restrains of limited determined price, market scale, and global competition frequently. Provided that the enterprise slashed the cost and enhanced the production, then the performance provided would not be able to meet the stockholders and employees' requirements. Consequently, sustainable operation growth enables to boost common development between the employees and enterprise. According to Kaplan and Norton (1992), Kaplan and Norton (1993) and Kaplan and Norton (2008), the scope of influencing operating revenue growth is wide, for example, the operation strategy, marketing strategy, human resources management factors and production process of high quality. The enterprise must take a variety of measures effectively to reach the financial goals, and then attain the enterprise performance.

Take the stock price and relationship of financial operation as the research topic, the stock price of corporation rose with the level of financial leverage discovered by Masulis (1983). Simultaneously, the value of corporation is related to the debt level positively. Jensen (1986) defined the free cash flow as the cash flow left by the

enterprise investing all net present value in the plan is greater than zero; in addition, he mentioned the managers and stockholders held different attitude from distribution of free cash flow due to the differences of profits. Accordingly, agency costs occurred to influence the corporation performance. Jensen (1986) and Jensen (1989) declared the future performance of corporation would respond to the quality of current decision and strategy.

Further, the agent conflict between the managers and stockholders is the factor lasting effect on enterprise performance announced by Joseph and Richardson (2002). The managers and stockholders have different suggestions of sharing methods to residual cash of enterprise, which is the main reason. Additionally, Roberts and Mizouchi (1989) stated biotech industry required investing large-scale resources to develop aiming at the biotech industry with exclusive characteristics. The larger the investing amount in biotech and pharmaceutical corporations, the longer the capitol payoff period is. Hence, these corporations require more potent competence of financing retaining financial status in the long run.

*2.2 Products and R&D Technology*

Numerous high-tech corporations, including biotech and biopharmaceuticals require relying on constant innovative R&D technology and products to maintain corporation advantage. A great deal former research literatures consent on the product and technology research and development as the measurement of key performance indicator for enterprise operation. The intangible assets possess some level of contribution with the creation of enterprise value (Osborne, 1998); besides, the patent is the storage of knowledge for enterprise organization as well as influences the performance remarkably, stated by DeCarolis and Deeds (1999). Bontis, Keow, and Richardson (2000), Tseng and Goo (2005), and Kijek (2012) proclaimed the same level of intellectual capital enabled to effect corporation performance, the reason of which was the intellectual capital to reflected the organization creation and to draw on the competence of new knowledge.

The investments in R&D in the enterprise facilitated the revenue growth indicated by partial studies. Griliches (1980) discovered the positive association between the competence of R&D and production in the enterprise while focusing on trace the data of R&D in the manufactures from 1958 to 1963. In addition, Griliches (1981) observed the significant association among the evaluation of financial market, R&D investments and patent. Consequently, the R&D investments and patent right is the core indicator to evaluate the operation performance. The R&D would be able to affect the growth of future revenue in the manufacture revealed by Morbey and Reithner (1990), which is similar with the studies of Morbey and Reithner (1990). The study learned the marked and positive effects on profits between new product and the expenses on R&D by Sougiannis (1994). Morbey and Dugal (1992) studied the less the corporation spent, the higher opportunities the revenue reduced during the course of economic recession. Megna and Klock (1993) and Hall (1993) took high-tech semi-conductor industry as the research object and learned the dedications to R&D resources possessed the positive influence on the rate of return on investment case. The productivity would increase as well while increasing investments in the R&D. Lasting accumulated R&D investments enabled the corporation rewards retain more stable. The study of Lev and Sougiannis (1996) and Lev and Sougiannis (1999) indicated the enterprise earned 2.328 times operating profit margin as increasing R&D expenses per unit.

Some studies stressed the dedication to R&D resources and association between stock price and market value. The expenses on new products and R&D technology possessed marked effects discovered by Sougiannis (1994). According to Lev and Sougiannis (1996) and Lev and Sougiannis (1999), the expenses on R&D aimed at the performance of stock price in the enterprise on stock market. What is more, the expenses on technology development with future revenue possessed positive effects, as an intangible asset, the result of which enabled to account for the difference of market value in high-tech industry from accounting and book value. Further, R&D capital, a risk, a traditional risk indicator is unable to manifest observed by Lev and Sougiannis (1996) and Lev and Sougiannis (1999). Jaffe, Trajtenberg, and Fogarty (2000) and Bosworth and Rogers (2001) showed the patent right was capable of enhancing operation performance related to the corporation value. Deeds (2001) explored the relevant effects on average proportion of expense on R&D in high-tech corporation, the competence of technology development and the numbers of corporations taking part in the research groups to value added of corporation market. As the result, these factors to market value added possessed positive effects. Pearl (2001) studied the financial date in 3500 corporations in the US from 1964 to 1988. The result of this study discovered the ratio between average market value and book value of corporation would increase 4.3% assuming the R&D expense went up to 1%.

A few studies focused on exploring the effect on the enterprise finance and operation performance for the dedication of R&D resources in biotech industry from different countries. The applied frequency of patent right is related to operation performance in biotech corporation as empirical result observed by Pazderka (1999).

Cumming and Macintosh (2000) regarded biotech industry in Canada as the research object, discovering the expenses is not quite similar with different R&D stages in the enterprise. Generally speaking, it would cost greater outlay on early stage of R&D. Relatively, the R&D outlay cost less subsequent to the products or R&D technology getting stable in biotech corporations. Meanwhile, Hall and Bagchi-Sen (2002) observed the effects on expenses on R&D intensity and innovation measures to operation performance, taking biotech industry in Canada as the research object. Manufacture performance incorporated the general revenue, product sales revenue, royalty, and the revenue of inspection and experiment service among others. The study of Hall and Bagchi-Sen (2002) indicated there was not marked association between the innovative measures and general revenue in the manufactures. The empirical result showed the positive correlation between R&D investments and enterprise financial performance. Besides, different R&D investing strategies possessed differences as well. The biotech enterprise with higher R&D technology values product research department rather than the enterprise with lower R&D technology values sales department. Most of the literature reviews mentioned above reached a consensus on product and R&D technology as the key indicator of measuring enterprise operation performance.

*2.3 Production and Quality Management*

Either in Taiwan or in other countries, most of biotech and biopharmaceutical corporations are part of manufacturing industry or the laboratory with well-equipped production and operation management system. As far as the manufacturing industry is concerned, well-equipped production, operation management and quality management become the resource of enterprise competition. The competition of enterprise incorporates service and quality, rate of return on investment and productivity generalized by Skinner (1969). Hence, imaginably and obviously, the performance of corporations enables to be measured by the factors of production, operation management and quality management. Fiegenbaum and Thomas (1990) deemed the control competence of providing products and limitation period of service would be able to be the foundation of obtaining competitive advantages. Consequently, production effectiveness is regarded as a resource for the enterprise. No matter push or pull production systems possessed their pros and cons; however, advanced production management systems brought about the huge profits for the enterprise exactly learned by Spearm and Zazanis (1992). According to Jesssop and Sum (2000), the enterprise increasingly stressed on the time management, production and operation management to enhance the performance during the course of globalization. Moreover, Jesssop and Sum (2000) indicated the advantage of rapid respond might not unable to be sensed by the managers or clients, yet the huge value would be eventually brought for the enterprise. Based on the just in time production as research issue, Fullerton and McWatters (2002) categorized the level of features of enterprise accordance and just in time production as well as explored the relationship between JIT and enterprise performance indicator. Corry and Kozan (2004) and Geraghty and Heavey (2005) stated the differences between production strategies adopted by the enterprise and production management system would influence corporation performance.

Quality management has been regarded as one of the most significant issues in the field of production and operation management in numerous literatures for the past years. Quality management is described as concrete accomplishments at the end of production and operation procedure; in the meantime, a key indicator to measure enterprise performance. White and Ruch (1990) emphasized the significance of quality management as well as regarded the quality as the first prior task in the enterprise. The enterprise devoted the enhancement of product quality so as to lessen unnecessary waste and to reduce production cost to ameliorate the efficiency. The study of Ittner and Larcker (1995) learned the association between total quality management (TQM) and the implementation of TQM and performance. The result discovered quality management affected on enterprise performance with some deferred characteristics. In other words, the efforts of enhancing service and product quality the enterprise put positively influenced on operation performance. Chenhall (1997) raised the key indicator related to TQM and discovered the effects of TQM on competence of enterprise revenue and operation performance. Otherwise, there were scholars mentioned valuing cost control and the significance of cost efficiency for creating outstanding operation performance by the enterprise. Kim and Mauborgne (2005) analyzed the cost control and the cost efficiency in value chain with noticeable influence on creating value for enterprise.

*2.4 Organization Characteristics and Operating Management*

The effective factors as the organization characteristics of enterprise include the enterprise scale, enterprise history, market share, brand image and human resources. The enterprise integral operating strategy, business mode and marketing strategy are involved in the enterprise operating management. Obviously, the organization characteristics of enterprise and operating management affected the operating performance and competition either directly or indirectly. The organization characteristics of enterprise and the situation of operating management resulted in the difference due to in the environment with various industries. This point of view has

been proved by the numerous of former research literatures. Schumpeter (1950) analyzed the relationship the competition and integral industry structure in the similar industry, the result of which discovered the manufactures possessed noticeable effects on market monopoly for the enterprise scale, date of establishment and market share. Amato and Wilder (1990) indicated the corporation scale influenced operation performance.

Human resources management of enterprise affected the operating performance possibly. Becker (1964) and Williamson (1979) studied the relationship between events of human resources management and performance in the enterprise. The system of well-planned human resources management enabled the employees to own sense of participation, to dignify themselves and to reinforce the organizational commitment and loyalty for the enterprise. The advantages not only reduced the turnover rate, but also enabled the employees to work hard to enhance the performance. The study of Wright, Ferris, Hiller, and Kroll (1995) and Delaney(1996) observe the competences of appealing and retaining the elite would enable to maintain the competitive advantages persistently. The policies of human resource management and the attraction of enterprise prestige for employees possessed noticeable effects. Furthermore, the effects would influence the integral operating performance. Kaplan and Norton (1996) indicated the senior executives were able to convert their visions into the goals and strategies of middle executives firstly, and then into the mobile proposals and goals of first level personnel. The human resources in enterprise are able to associate with organizational performance indicator each other.

What is more, other factors as organization characteristics and operation management would be possibly able to influence operation performance for enterprise. Chenhall and Langfield-Smith (1998) stressed the management technology and the linked strategy of establishment enabled to promote organization performance. With well-image, social recognition and high-prestige, the operation performance would be better indicated by Benjamin and Podolny (1999). These products possessed higher competition to defeat the opponents more easily on the market, which enabled to increase the enterprise revenue and market share as well as to raise the operation performance. Based on the study of Roberts and Dowling (2002), the enterprise with market prestige, a key factor, to predict its rate of return on common stockholders' equity. The prestige of enterprise possessed positive effect on the rate of return on common stockholders' equity, that is to say. Turban and Cable (2003) studied the effects on enterprise prestige for enterprise attraction. With well prestige, the enterprise obtained higher competitive advantages on not only talented personnel market, but also on the market of product marketing. The higher client loyalty and the acquisition of resources were in favor of high-standard operation performance for enterprise. Saxton and Dollinger (2004) took the enterprise merger as the research topic to analyze the association between enterprise prestige and acquirer for enterprise evaluation. Obviously, the enterprise prestige would affect enterprise operation performance and merger determination of acquirer discovered by the research result. According to Lai, Chiu, Yang, and Pai (2010), the enterprise prestige, social image and enterprise brand associated with enterprise operation performance positively. The social image and prestige of enterprise assisted the asset in enhancing value of enterprise brand. Above all, the research needs to take various respects of organization characteristics and operation management into consideration comprehensively while evaluating the enterprise performance.

## 3. Methodology

Literature review and modified Delphi approach were adopted to construct the hierarchical framework on this study. To analyze and establish influential relationship between the elements, ISM was applied. Following by the establishment of hierarchy architecture, FANP was used to calculate overall weights and priorities of the elements. Subsequently, performance evaluation table was designed to help the organization figure out the optimal solution.

### *3.1 Modified Delphi Approach*

Murry and Hammons (1995) amended traditional Delphi approach and announced modified Delphi approach. In accordance with Hill and Fowles (1975) and Stewart (1987), traditional Delphi approach could be regarded as a group communication and process of co-decision. In the process of proceeding with the questionnaire analysis mainly, every member was allowed to express his/her opinion on certain issue with equal value. The researcher stood out the replied opinions and sought the consensus through comprehensive experts, scholars, the expertise and opinions of profitable groups. Without insufficient strict qualitative research, Delphi approach, the scientificity and systematicness of quantitative research was thoroughly applied. The researcher could apply Delphi approach to search the consensus of the experts with high-ambiguity, high-complexity and argumentative issues. Consequently, Delphi approach possessed some advantages as brainstorming, retaining dependent discrimination of experts, breaking temporal isolation dilemma and unnecessary complex statistics. Rowe and Wright (1999) stated traditional Delphi approach was supposed to be the participation with anonymous groups.

For this reason, the advantage of collective decisions of experts and brainstorming could be retained, on the other hand, the possible interruption for issue discussing avoid by experts while communicating face to face. Besides, selecting appropriate numbers of experts, scholars or practitioner of traditional Delphi approach is the primary measure. The expert panel with ten people above enabled to obtain the minimum deviation from statistics, but the maximum reliability of groups proclaimed by Dalkey (1969). The numbers of members are supposed to be 15 to 30 members with high homogeneity of expert panel members suggested by Delbecq, Van de Ven, and Gustafson (1975). The numbers of members are supposed to be from 5 to 10 members assuming the expert panel is the group with high heterogeneity.

However, the analytic process of tradition Delphi approach is not without any defects or controversy. Hill and Fowles (1975) stated these so-called 'experts' whether enabled the research topic to possess proficiency in the process of selecting members of expert group. Moreover, the process of awareness of issues, problem analysis and consensus formation was overly lengthy in the traditional Delphi approach, which has resulted in the deviation of principle at all times. Murry and Hammons (1995) presented modified Delphi approach and attempted to figure out the defect. The specific implementation and statistical mode of modified Delphi approach is similar to traditional Delphi approach, but the difference is Murry and Hammons (1995) ignored the complex steps on open-end questionnaire in the first round. The structured questionnaire was directly developed by the research results in literature reviews or the researcher's plan, as well as the ways of expert interviews. Modified Delphi approach is able to economize the time and the assumptions of open-end questionnaire, which enables the expert group to pay attention on research topic and raise the response rate of questionnaire as taking part in the research.

*3.2 Interpretive Structural Model*

ISM was stated by Warfield (1973a), Warfield (1973b), Warfield (1974), Warfield (1975), Warfield (1976), and Warfield (1990) to analyze and structure the approach of complex associated mode between the elements in one system. In a meantime, Warfield (1973a) presented three suggestions for the ways of drawing up the strategy and structuring model. Primarily, the researcher is supposed to improve the basic concept of building analytic model. Then, the researcher adapts the mathematical linguistics to build the model. Finally, the researcher is supposed to convey the crucial ideal and simple improved projects through built analytic model. Hence, ISM has been described as an innovative approach with the elements of effective analytic system, as well as a useful technology with quantitative aid (Senecal, Kalczynski, & Nantel, 2005). ISM, a quantitative approach, applied the relationship among different types of elements to reform into relation hierarchy graph accounted for by Warfield (1974). ISM is adapted to elaborate the relationship among different types of elements by the means of the concepts of hierarchical digraph and discrete mathematics in graphic theory drawn on the analysis. The researcher takes advantage of ISM to present the association among all the elements in one system combining with the behavioral science, the mathematics concept, the group decision and the computer-aid. Finally, the hierarchy with more complete multi-level structure is called 'map'. As a result, the decision maker would be able to organize the information and concept definitely and systematically, as well as to improve the integral awareness. In other words, the aim of developing ISM is to collect and compact the information to analyze the model structurally. Then, the researcher is able to establish the tool of management decision so as to figure out and analyze the troubles in the complex situation.

Traditionally, attempting to discover the relation among different elements, the numerous of research approaches depend on the opinions and senses from the researchers or testees. Tazki and Amagsa (1997) stated people rely on their intuition and experience discriminating and considering complex and diverse issues in the process of researching at all times. The researcher must take a number of impact factors and combination to be the formation of hierarchy while proceeding with the complex issues or the researches of managing the organization or the systematic tasks. Nonetheless, the more impact factors or the more complex associated level, the harder the discovery of existent association directly. Through ISM, the associated sequence among all elements in the complex system could be analyzed by the researcher, as well as built the structure with hierarchical association by quantitative approach. ISM is not only adapted to figure out the variety of levels with abstract issues, but also used to develop the deeper issues and conceptual understanding. Moreover, the manager would establish more effective decisions by further design and projecting the detailed solutions. According to the research of Tazki and Amagsa (1997), Jharkharia and Shankar (2004) and Ravi, Shankar and Tiwari (2005), ISM enabled the researcher to ponder over the complex issues systematically and logically. Based on the relation among all variables by defining a problem or an issue, the researcher is able to construct integral systemic structure.

ISM, mainly spilt into a couple of steps as below, is through the process of binary matrices:

Step 1. Direct association among components of analytic system: Assume the set *S* is formed by nth factors, then $S = \{S_1, S_2, \ldots, S_n\}$. $(S_i, S_j)$ is the ordered pair between $S_i$ and $S_j$. All factors in set *S* must be binary relation one another. The research result would combine with this step by modified Delphi approach.

Step 2. Adjacency matrix: Adjacent matrix is also called relation matrix, the aim of which is to discover the mutual relation among the factors. The relative facto discovered from the system is defined as $C_i$, $i = \{1,2,3, \ldots, n\}$. Place the factor into the matrix and proceed with pairwise comparison. Assume the factor $C_i$ in the row is directly related to the factor $C_j$ in the column, then $A=[a_{ij}]$ existed defined as:

$$a_{ij} = \begin{cases} 1 & \text{suppose } i \text{ influenced on } j \\ 0 & \text{suppose } i \text{ had no influence on } j \end{cases} \quad (1)$$

$$A = \begin{array}{c} \\ C_1 \\ C_2 \\ \vdots \\ C_n \end{array} \begin{array}{c} \begin{array}{cccc} C_1 & C_2 & \cdots & C_n \end{array} \\ \begin{bmatrix} 0 & a_{12} & \cdots & a_{1n} \\ a_{21} & 0 & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & 0 \end{bmatrix} \end{array} \quad (2)$$

Step 3. Reachability matrix: Add adjacency matrix *A* with identity matrix *I* to form matrix *M*. Then, use Boolean algebra to proceed with continued product for matrix *M*. Reachability matrix *M** is acquired as matrix *M* reaches convergence.

$$M^h = M^{h+1} = M^* \quad h>1 \quad (3)$$

Step 4. Hierarchy graph: Apply reachability matrix *M** to convert into hierarchy matrix. According to reachability matrix *M**, reachability set $R$ and priority set $P$ are able to be calculated.

$$R = \{C_i | m_{ji}^* = 1\} \quad (4)$$

$$P = \{C_i | m_{ij}^* = 1\} \quad (5)$$

$$R \cap P = R \quad (6)$$

Finally, the related structure graph is able to be constructed by means of the association between the core factors and other factors.

*3.3 Fuzzy Analytic Network Process*

AHP was proposed by Thomas L. Saaty in 1971. It is one of the well-known multiple criteria decision making (MCDM) techniques. AHP is adopted to systemize and stratify the complicated questions to deduct the risk of fault decision. Van Laarhoven and Pedrycz (1983), using the concept of fuzzy to solve the values in the pairwise comparison matrix with subjectivity, imprecision and vagueness…etc in traditional AHP, who stated fuzzy analytic hierarchy process (FAHP). Saaty (1996) introduced analytic network process (ANP) to deal with the problem of dependence and feedback existed between the elements. This research applied FANP to calculate overall weights of the elements.

Computational procedure of FANP:

Step 1: Constructing the hierarchical framework

Literature review and modified Delphi approach was adopted to construct the hierarchical framework on this study. To analyze and establish influential relationship between the elements, ISM was applied. Following by the establishment of hierarchy architecture, each evaluator respectively enables to give pairwise comparison matrices by a nine-point scale.

Step 2: Constructing fuzzy pairwise comparison matrices

Buckley (1985) reported the adoption of geometric mean to integrate the opinions of experts enables to enhance consistency and precision of factor judgment. The score of geometric mean from all survey respondents is made up as the middle value ($M_{ij}$) of triangular fuzzy number (TFN) on this study. The largest value and the smallest value of score among all survey respondents are made up respectively as the upper bound ($U_{ij}$) and lower bound ($L_{ij}$) of TFN. For example, the pairwise comparison values from 5 experts are as 8, 0.33, 5, 4, 0.5, the fuzzy number of which is (0.33, 1.92, 8.00). Subsequent to the combined opinions from all experts, the fuzzy positive reciprocal matrix is built immediately.

$$\tilde{T} = \begin{bmatrix} 1 & \widetilde{t_{12}} & \cdots & \widetilde{t_{1n}} \\ 1/\widetilde{t_{12}} & 1 & \ldots & \widetilde{t_{2n}} \\ \vdots & \vdots & \vdots & \vdots \\ 1/\widetilde{t_{1n}} & 1/\widetilde{t_{2n}} & \cdots & 1 \end{bmatrix} \tag{7}$$

where $\widetilde{t_{ij}} = (L_{ij}, M_{ij}, U_{ij})$

Step 3: Defuzzification

Liou and Wang (1992) was adopted to transform fuzzy number into crisp value on this study. The method is expressed in equation (8). $\alpha$ denotes the risk preference of decision makers. The value of $\alpha$ is set between 0 and 1. The larger the number, the more stable the decision making environment. $\beta$ denotes the risk tolerance of decision makers. The value of $\beta$ is set between 0 and 1. The larger the number, the higher the risk.

$$D_{\alpha,\beta}(\widetilde{t_{ij}}) = [\beta \cdot f_\alpha(L_{ij}) + (1-\beta) \cdot f_\alpha(U_{ij})] \tag{8}$$

$$\text{where} \quad f_\alpha(L_{ij}) = \alpha(M_{ij} - L_{ij}) + L_{ij}$$

$$f_\alpha(U_{ij}) = U_{ij} - \alpha(U_{ij} - M_{ij})$$

$\alpha \in [0,1] \quad \beta \in [0,1]$

Equation (9) represents the single pairwise comparison matrix.

$$D_{\alpha,\beta}(\tilde{T}) = \begin{bmatrix} 1 & D_{\alpha,\beta}(\widetilde{t_{12}}) & \cdots & D_{\alpha,\beta}(\widetilde{t_{1n}}) \\ 1/D_{\alpha,\beta}(\widetilde{t_{12}}) & 1 & \cdots & D_{\alpha,\beta}(\widetilde{t_{2n}}) \\ \vdots & \vdots & \vdots & \vdots \\ 1/D_{\alpha,\beta}(\widetilde{t_{1n}}) & 1/D_{\alpha,\beta}(\widetilde{t_{2n}}) & \cdots & 1 \end{bmatrix} \tag{9}$$

Step 4: Calculating eigenvectors and analyzing consistency $\lambda_{max}$ and *X* denote the eigenvalue and eigenvector of the single pairwise comparison matrix $D_{\alpha,\beta}(\tilde{T})$ respectively.

$$D_{\alpha,\beta}(\tilde{T}) \cdot X = \lambda_{max} \cdot X \tag{10}$$

To ensure the logic judgment of expert fulfills the consistency, consistency ratio (*CR*) is used to measure (Saaty, 1980). The level of consistency of matrix is satisfying if the value of *CR* is less than 0.1.

$$CR = CI/RI \tag{11}$$

where consistency index *(CI)* = $(\lambda_{max}\text{-}n)/(n\text{-}1)$

random index (*RI*) is the average index for randomly generated weights

Step 5: Constructing supermatrix

All eigenvectors are gathered together to become a supermatrix. A standard form of a supermatrix is shown as equation (12) (Saaty, 1996). $W_{21}$ indicates the influence of the goal on the criteria. $W_{22}$ represents the internal dependence of the criteria. $W_{32}$ denotes the influence of the criteria on the alternatives. *I* and 0 represent the identity matrix and the zero matrix respectively. A supermatrix comprises all elements of the goal (*G*), the criteria (*C*) and the alternatives (*A*).

$$M_{super} = \begin{array}{c} \\ G \\ C \\ A \end{array} \begin{array}{c} \begin{array}{ccc} G & C & A \end{array} \\ \begin{bmatrix} 0 & 0 & 0 \\ W_{21} & W_{22} & 0 \\ 0 & W_{32} & I \end{bmatrix} \end{array} \tag{12}$$

The matrix $M_{super}$ is the unweighted supermatrix which needs to be normalized to satisfy the column-stochastic principle. In other words, using the method of normalization to make each column of the matrix sum to one. Such kind of stochastic matrix is called weighted supermatrix. In order to achieve convergence status, the weighted supermatrix to the power of *2k+1* is processed. The number of *k* is subjectively determined. The multiplication stops until the columns of the supermatrix become identical. After the calculation of limiting described above, a weighted supermatrix can be transformed into a limiting supermatrix. The overall

priorities of the elements are obtained by normalizing the limiting supermatrix. On this study, only the elements of the goal and the criteria were listed in the supermatrix to calculate overall weights.

*3.4 Performance Evaluation Table*

The ideal of performance evaluation table on this study is based on the evaluation presented simply and rapidly by the decision maker while taking several alternatives into account. Fill in 'Alternative', 'Evaluator' and 'Date' to analyze the result through FANP and list the name and weight of all criteria and sub-criteria as below. Table 2 is accounted for the evaluation explanation of evaluation table established by decision maker, the sequence of which is rated respectively by seven ranks is: Extremely good (Scores 86-100), Quite good (Scores 71-85), Slightly good (Scores 56-70), Average (Scores 46-55), Slightly bad (Scores 31-45), Quite bad (Scores 16-30) and Extremely bad (Scores 0-15). The product multiplied by the score of all criteria from weight and real rating of all sub-criteria, as well as the sum is the total scores in all sub-criteria. The best decision presented according to the score of all criteria and the rank of total rank.

Table 2. Performance evaluation table

| Alternative: | | Evaluator: | Date: |
|---|---|---|---|
| Criteria(Weight): | Sub-criteria(Weight): | Score: | Score Note: |
| A | A1 | | 86-100: Extremely good |
| | A2 | | 71-85: Quite good |
| | ⋮ | | 56-70: Slightly good |
| B | B1 | | 46-55: Average |
| | B2 | | 31-45: Slightly bad |
| | ⋮ | | 16-30: Quite bad |
| C | C1 | | 0-15: Extremely bad |
| | C2 | | |
| | ⋮ | | |
| Total Score: | | | |

## 4. Empirical Results

The study sequentially applied four types of research approaches in order to build the evaluation modes of operation performance in Taiwan biotech and pharmaceutical corporations, incorporating modified Delphi approach, ISM, FANP and performance evaluation table. In accordance with literature review and fifteen executives at high-level in Taiwan biotech and pharmaceutical corporations, subsequent to the questionnaire of expert interview through modified Delphi approach, proposed by Murry and Hammons (1995) as the first stage to compile 4 criteria and 18 sub-criteria considered while assessing the operation performance in the corporation, as Figure 2. These fifteen experts with more than 10-year work experience possess fair awareness and research in depth in the biotech and pharmaceutical industry. Dalkey (1969) and Delbecq et al. (1975) suggested the numbers of expert team with high homogeneity be more than 10 people. All experts were supposed to sift the significance and supply the suggestions aiming at all criteria and sub-criteria via several persistent feedbacks until they reached the consensus. The explanation of criteria and sub-criteria is shown as Table 3.

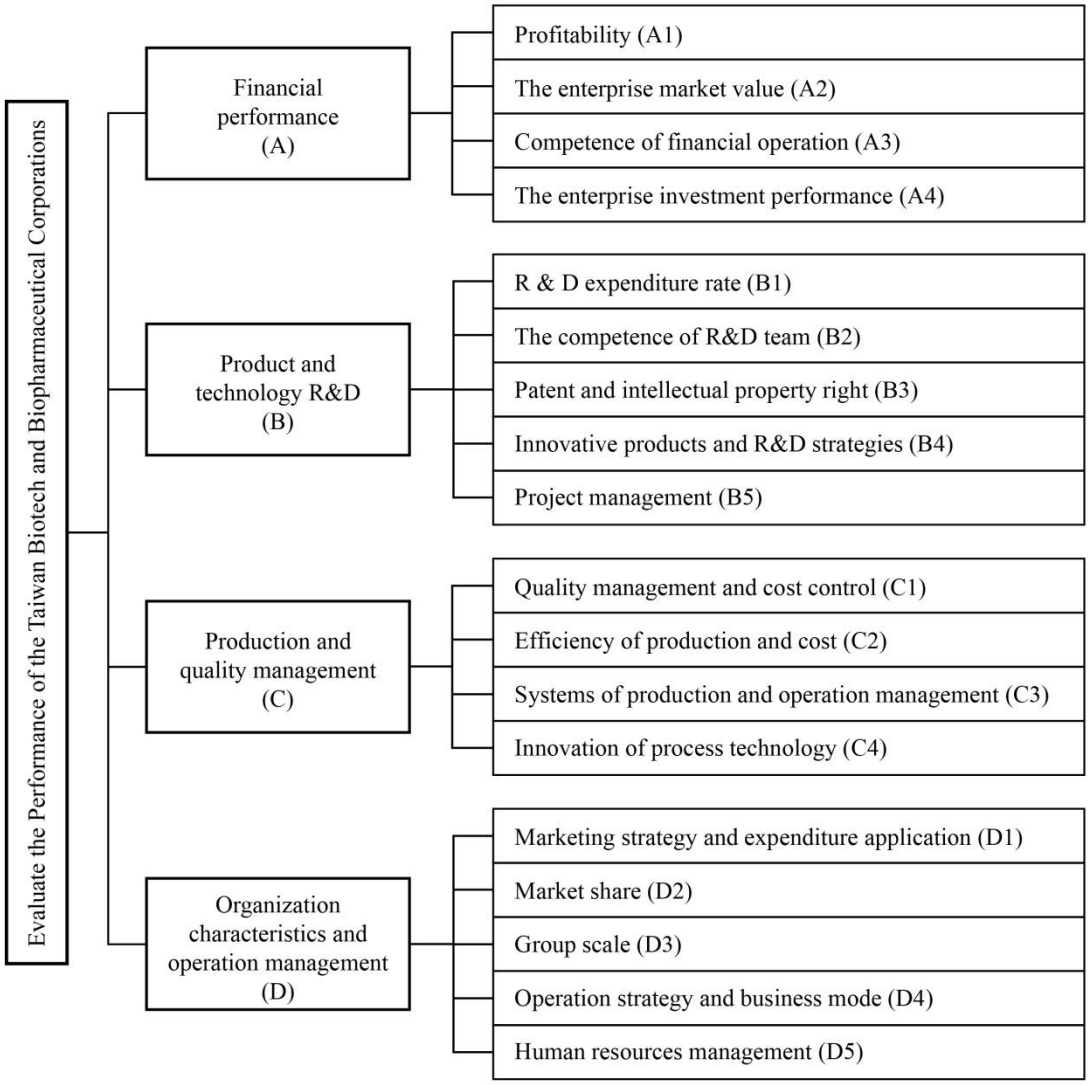


Figure 2. Hierarchical structure of problem in application

Table 3. Explanation of criteria and sub-criteria

| Criteria and Sub-criteria | Explanation |
|---|---|
| Financial performance (A) | |
| Profitability (A1) | The enterprise profitability indicator showing the operation revenue and the amount of profit and standard mainly as well incorporates operating profit ratio, ratio of profits to cost, cash earnings coverage ratio, return on total assets ratio, rate of return on common stockholders' equity and rate of return on capital. |
| The enterprise market value (A2) | The enterprise market value refers to the market value on the stock market. On the premise of fixed capital structure of enterprise, the higher the integral value, the greater the value of equity capital of enterprise. Indeed, the stock value of enterprise is getting higher. Hence, the enterprise stock price accomplishing the value market is determined by enterprise value. |
| Competence of financial operation (A3) | Financial operation is attributed to take advantage of various financial management technology, capital allocation and financial leverage in order to require the profit, cost reduction and working capital. The enterprise with advanced competence of financial operation possesses more opportunities to figure out the financial problems by more effective solution than the same business. For example, the biotech and biopharmaceutical corporations need more financial operation competence to go through lengthy period of product R&D. |
| The enterprise investment performance (A4) | The enterprise investment refers to invest in single or several investing cases by fortune and resources to anticipate earning the revenue in the future. Frequently, the larger the amount the high-tech industry invested in, the longer the capital payoff period is. Accordingly, the enterprise investment performance in high-tech |

| Criteria and Sub-criteria | Explanation |
|---|---|
| | corporations depends on the financing competence and lasting stable financial support. |
| Product and technology R&D (B) | |
| R&D expenditure rate (B1) | R&D expenditure rate is prescribed as the expenditure consumed on R&D invested by the enterprise, accounting for its proportion within the turnover. The enterprise retains its competitive advantages by means of development of new products and upgrade of old products. As a result, the biopharmaceutical corporations enhance R&D rate to reinforce the development of enterprise effectively. In other words, R&D expenditure rate demonstrated the current ambitious of enterprise and possible profits in the future. |
| The competence of R&D team (B2) | The researcher is as a basic unit to compose a R&D department in the enterprise. The proportion of R&D personnel plunging is a decisive factor of influencing the competence of R&D team. The rate of researchers refers to the quantity and quality of researchers, accounting for the proportion of the sum in human resources. |
| Patent and intellectual property right (B3) | Patent and intellectual property right is described as the governmental department entitled inventors to invent exclusive rights by the means of producing, marketing or other ways within the time limit. Patent and intellectual property right is split into three types as invention, utility model and industrial design. The enterprise is able to preserve its own right effectively and privilege of forbidding other people to use while possessing the patent and intellectual property. Therefore, the patent and intellectual property belongs to one part of intangible property in enterprise as well as affects on either or future profits. |
| Innovative products and R&D strategies (B4) | Technology R&D refers to the reliable quality, feasible cost and innovative products are transferred by the R&D results of Science and Technology. The technology, products and services are enhanced substantially by the adaptation of innovative products and R&D strategies. The development and R&D associated with each other so closely that the development of new technology would result in the brand new product revolution. |
| Project management (B5) | Project management is defined as the knowledge of management studies, implement and technology the manager draws on to figure out the problems as executing the project or fulfilling the demand of project. In the era of Knowledge-based economy, enhancing project management is a significant way to survive. How to possess potent project management is a key indicator of enterprise development as well. |
| Production and quality management (C) | |
| Quality management and cost control (C1) | The products manufactured by the enterprise not only possess the functionalities as the reliability, the security and the completeness. What is more, quality management and cost control must be organized and implemented by the enterprise. As a result, quality management and cost control facilitate the enterprise to improve its way of operation management and production, resulting in good prestige and potential profits for the enterprise. Cost and quality, more traditional competitive conditions though, command the most competition of products and services for the enterprise. |
| Efficiency of production and cost (C2) | Production efficiency referred to the ratio between the real output of process and maximum output under the fixed input; otherwise, it is able to reflect the level of maximum output, projected goal or the optimal operating service the enterprise reached. Cost efficiency indicated the difference between the input factor prices and output under the cost per unit. How the enterprise cuts down the cost, enhances the production efficiency and promotes the quality becoming the key indicator that whether the enterprise possesses competitive advantages while encountering the increasing intense competitive environment in global. |
| Systems of production and operation management (C3) | The enterprise takes advantage of the systems of production and operation management effectively to use the production resource so as to fulfill the goals of operation and profits. The systems of production and operation management enable the enterprise to put the clients up to meet their needs in society, the products and services of market requirements. Accordingly, the systems of production and operation management not only efficiently manufacture the products or provide the services, but also bring about the lasting advantages for the enterprise. |
| Innovation of process technology (C4) | The innovation of process technology is defined as the events that the enterprise adapted research and drew on innovative production technology, operating programs and approaches to enhance the product quality and production efficiency. The enterprise is able to economize the energy effective, mark down the consumption of raw materials and reduce the product cost by means of the innovation of process technology. Furthermore, the innovation of process technology enables the enterprise to defeat the competitor to stand out in the battle of orders from time to time. |
| Organization characteristics and operation management (D) | |
| Marketing strategy and expenditure application (D1) | Take the customer's requirements as a starting point, the enterprise obtained the crucial data regarding the customer's requirements and ability of purchasing in accordance with past experience. The enterprise enables to organize all operating events by means of using marketing strategies and marketing expenditure well. Broadly speaking, marketing strategy is a series of strategies as product strategy, price strategy, channel strategy and promotion strategy coordinated by the enterprise to achieve the marketing goal. |

| Criteria and Sub-criteria | Explanation |
|---|---|
| Market share (D2) | Market share refers to the ratio occupied by the product or service in the same kind competitive marketing within a certain time. Under the circumstance of fixed market, the higher market share the corporation is, the greater the product sales are. Hence, the market share not only shows the control of market and price, but also discriminates the enterprise competition as the significant factor. |
| Group scale (D3) | The current enterprise operating modes are based on the group operation. Generally speaking, group scale incorporates the scope of enterprise operation, the level of diversification, the organization of group and revenue scale. The group scale with variety of types is formed by different gradations and the combination of different production factors. In general, adequate group scale assists the enterprise to enhance its competition and dominance on the market. |
| Operation strategy and business mode (D4) | The operation strategy and business mode are referred as the reaction the enterprise adapted to create the survival and the developed space in fierce and competitive business environment while taking its own pro and cons into consideration. Also, it revealed the role and the value in the enterprise plays in the supply chain and the value chain. The superior and feasible operation strategies and business mode enable the enterprise to possess the revenue and profits with stability and sustainability. |
| Human resources management (D5) | Human resources management refers to of a series of human resources policies and the related management events. Human resources management includes a series of process as the employee recruitment, the training, the appointment, the evaluation, the encouragement and the adjustment. The eventual goal of these events is to facilitate the enterprise to fulfill the goal. The goal and strategy of human resources management with coherence and perspicacity enable the enterprise to effectively use the resources, reduce the cost, enhance the profitability and satisfy the market demands. |

The mutual associated mode was used by the analysis of ISM and structure of sub-criteria at the second stage. As the result, the study on this research applied the result acquired at the first stage to design the questionnaire. Aiming at all sub-criteria proceeded with pairwise by inviting these same fifteen experts so that adjacency matrix of ISM analysis is appeared as Table 4. Following the adding adjacency matrix with identity matrix, the convergence is the continued product of matrix as the arithmetic, acquiring reachability matrix. The associated structure chart among the sub-criteria is shown as Figure 3.

Table 4. Adjacency matrix

| | A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | B5 | C1 | C2 | C3 | C4 | D1 | D2 | D3 | D4 | D5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 |
| A2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| A3 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 |
| A4 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| B1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| B2 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| B3 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| B4 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| B5 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| C1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| C2 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| C3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 |
| C4 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 |
| D1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| D2 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 |
| D3 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 |
| D4 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| D5 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

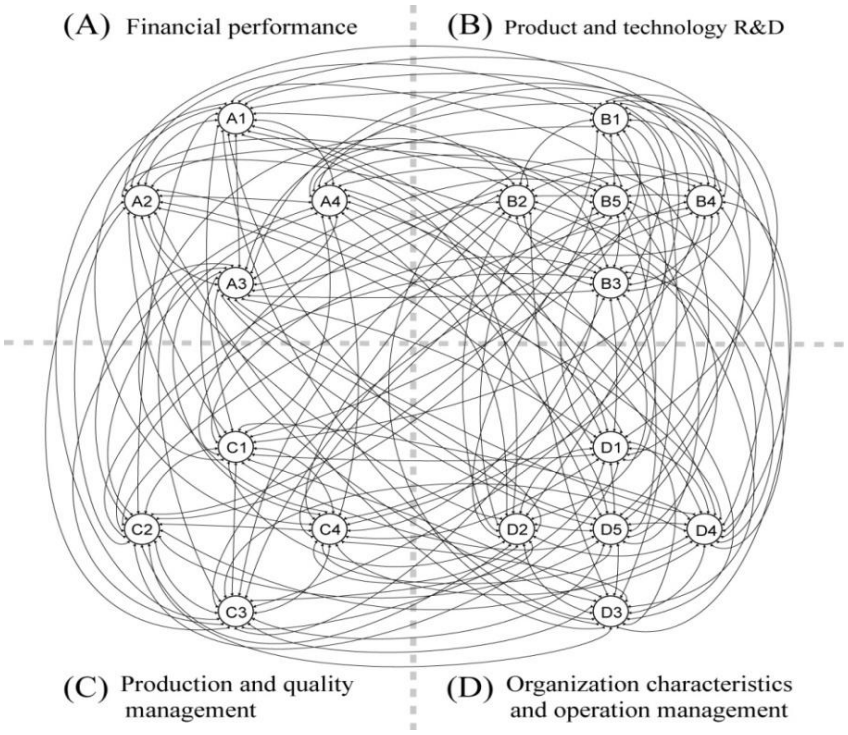


Figure 3. Structure chart among the sub-criteria

Subsequent to the building the relationship of hierarchical structure, the third stage is to fill out the expert questionnaire of FANP. These 15 experts interviewed previously proceeded with pairwise criteria, pairwise sub-criteria and pairwise comparison of dependability on this study. Then, the expert questionnaires were complied by advance integration to proceed with the analysis. The software of Matlab and Super Decision are used. The empirical result at this stage took the second layer as the example to explain progressively. According to the study method, fuzzy pairwise comparison matrix of each criterion in level 2 is complied as equation (13).

$$\widetilde{T}_2 = \begin{bmatrix} (1,1,1) & (0.25,0.66,2.00) & (0.33,1.59,4.00) & (2.00,3.30,6.00) \\ (0.50,1.51,4.00) & (1,1,1) & (0.50,2.22,5.00) & (2.00,4.23,6.00) \\ (0.25,0.63,3.00) & (0.20,0.45,2.00) & (1,1,1) & (0.50,2.08,5.00) \\ (0.17,0.30,0.50) & (0.17,0.24,0.50) & (0.20,0.48,2.00) & (1,1,1) \end{bmatrix} \tag{13}$$

Prior to the defuzzication, the risk preference of decision makers $\alpha$ and the risk tolerance of decision makers $\beta$ are required determining by the decision-maker. The environment of Taiwan biotech and pharmaceutical industry encountered some issues such as the less R&D resources, the poor resource integration, the insufficient technological uniqueness, the difficulty of fund-raising, the deficient in economic scale, uncoordinated related constitution and insufficient talented personnel and so on, leading to the erratic entire decision-making environment. Furthermore, due to the lengthy of R&D, delaying product development, high-cost of R&D and high failure rate, the industry, R&D-centered, explored to high risk. The environment influenced tremendously the decision-making, thus value $\alpha$ set as 0.2; value $\beta$ set as 0.8 owing to the higher risk tolerance of decision-maker's. The aggregate pairwise comparison matrix for level 2 is shown as equation (14).

$$D_{0.2,0.8}(\widetilde{T}_2) = \begin{bmatrix} 1.0000 & 0.6122 & 1.1708 & 2.9004 \\ 1.6335 & 1.0000 & 1.5642 & 3.0868 \\ 0.8541 & 0.6393 & 1.0000 & 1.5352 \\ 0.3448 & 0.3240 & 0.6514 & 1.0000 \end{bmatrix} \tag{14}$$

The eigenvector mutually compared among criteria and sub-criteria computed base on the formula. As the value of *CI* is 0.0121 of criteria and the value of *RI* is 0.90 of four comparability factors, the value of *CR* is 0.0134. The level of consistency of matrix is satisfying because the value of *CR* is less than 0.1. The value of *CI* and the value of *CR* of all pairwise comparison matrixes among sub-criteria passed consistent verification via assay. The analysis result of FANP is shown as Table 5.

The significance of criteria is "Product and technology R&D" (0.3841), "Financial performance" (0.2767), "Production and quality management" (0.2195) and "Organization characteristics and operation management" (0.1197) in sequence. The result met the current situation in Taiwan biotech and pharmaceutical industry, which is similar with the research result of Yang et al. (2010), Sheng et al. (2012) and Chen et al. (2014) in the meanwhile. Possessing the superior product and advanced technology has influenced vitally on the operation performance in biotech and pharmaceutical corporations. The irreplaceable competitive advantages in the enterprise is transformed by the R&D resources and of products and technology invested by the enterprise and specific results acquired by R&D team. Likewise, the efforts the biotech and pharmaceutical corporations made maintain continually the composition, the rate of market share and conglomerate goodwill for the corporations. Consequently, different weight gap authentically reflected current situation and cognition of experts in the industry as a whole.

The top 5 key sub-criteria influence the evaluation of corporation operating performance in biotech and pharmaceutical corporations in Taiwan are "Profitability" (0.1274), "Efficiency of production and cost" (0.1145), "Innovative products and R&D strategies" (0.0941), "Quality management and cost control" (0.0837) and "Operation strategy and business mode" (0.0835). Comparatively speaking, the last 5 key sub-criteria are "Human resources management" (0.0118), "Project management" (0.0132), "Innovation of process technology" (0.0176), "Competence of financial operation" (0.0237) and "Market share" (0.0286). The empirical result shown that the weight ranking of sub-criteria in different clusters excluding the existing clustering effect. In other words, there were no specific clusters of criteria with high or low weighted points in the midst of weight ranking of eighteen integral sub-criteria. Several phenomena are worthy to discuss in particular from the weight ranking of sub-criteria. The highest weighted point A1, profitability, stands for a significant and evident fact. As far as not only the biotech and pharmaceutical operations but also most of enterprises are concerned, the enterprise profitability is made use of as effective indicator to evaluate the operating performance. The indicator of profitability directly enables to appear the competence of funds appreciation in the enterprise as well as maximize the stakeholder's rights and interests as the outcome. As a result, the biotech and pharmaceutical corporations reach the optimum output and destined goal or the best level operation service. C2, efficiency of production and cost with the secondary highest weighted points, showed the enterprise possesses competitive advantages more than other enterprises in the similar industry by means of enhancing the production and cost efficiency. The third place is B4, innovative products and R&D strategies. The biotech and pharmaceutical corporations are bound to tolerant lengthier period of R&D of product and technology and input of R&D resources with more risks, different from electronic and information technology corporations. Accordingly, precise, practical and feasible R&D strategies of new product and technology are above all significant. The enterprise has change to acquire more profits and goodwill by enhancement of technology, product and service. C1, quality management and cost control, the fourth place. Most biotech and pharmaceutical corporations are part of standard production and manufacturing industry. For this reason, quality management and cost control urge the enterprise on enhancing its operating management and production. The fifth place of weight ranking of sub-criteria is D4, the operation strategy and business mode, the more traditional competitive condition in the enterprise, but still the most essential competitive source in the most enterprises so far.

Otherwise, the weight ranking of sub-criteria including in all criteria is at the end of 5 rankings, which appeared the data acquired by expert questionnaire is able to gain precise sub-criteria weighted points through FANP calculating is noticeable. Furthermore, the weighted points of 18 sub-criteria appear even descending trend seemingly. The accumulated weighted point of sub-criteria of top 5 rankings is 50.32% so that these five sub-criteria named key elements as building the mechanism of operating performance evaluation in Taiwan biotech and pharmaceutical corporations. Likewise, the accumulation of weights of other 13 sub-criteria is under 50%. Apparently, the experts tend to evaluate the operating performance of enterprise through the real results rather than the sort of 'input' indicator such as the input of R&D funds, innovative competence and management as the significant basis to evaluate the performance. The main reason consists in the input of resources Taiwan corporations possess is even less compared with biotech and pharmaceutical corporations in advanced countries. These resources incorporate talent personnel in the industry, R&D resources, advanced industrial environment, government support, fund scale and managerial experience. Moreover, Taiwan biotech and pharmaceutical corporations are bound to encounter the issues are lengthy period of product and technology, high-rate failure and the risk brought by international food and drugs acts, which enable the experts in this industry to analyze the indicator of performance evaluation and weighting with more practical attitude. Hence, the empirical analysis at this stage appeared the researcher is suppose to pay attention to the fact of industry existing while analyzing the operating performance in Taiwan biotech and pharmaceutical corporations. Besides, the researcher is proposed to focus on the practical output yield rather than the input resources in the enterprise.

Table 5. Final weights by FNAP analysis

| Rank | Criteria | Weight |
|---|---|---|
| 1 | Product and technology R&D (B) | 0.3841 |
| 2 | Financial performance (A) | 0.2767 |
| 3 | Production and quality management (C) | 0.2195 |
| 4 | Organization characteristics and operation management (D) | 0.1197 |
| Rank | Sub-Criteria | Weight |
| 1 | Profitability (A1) | 0.1274 |
| 2 | Efficiency of production and cost (C2) | 0.1145 |
| 3 | Innovative products and R&D strategies (B4) | 0.0941 |
| 4 | Quality management and cost control (C1) | 0.0837 |
| 5 | Operation strategy and business mode (D4) | 0.0835 |
| 6 | Group scale (D3) | 0.0733 |
| 7 | Patent and intellectual property right (B3) | 0.0684 |
| 8 | The enterprise market value (A2) | 0.0672 |
| 9 | Marketing strategy and expenditure application (D1) | 0.0527 |
| 10 | The competence of R&D team (B2) | 0.0454 |
| 11 | Systems of production and operation management (C3) | 0.0343 |
| 12 | The enterprise investment performance (A4) | 0.0317 |
| 13 | R&D expenditure rate (B1) | 0.0290 |
| 14 | Market share (D2) | 0.0286 |
| 15 | Competence of financial operation (A3) | 0.0237 |
| 16 | Innovation of process technology (C4) | 0.0176 |
| 17 | Project management (B5) | 0.0132 |
| 18 | Human resources management (D5) | 0.0118 |

At the last phase of the study, the top 10 listed Taiwan biotech and pharmaceutical corporations took the conglomerate revenue as the empirical research sample on this study. Based on the size of scale of conglomerate revenue, these corporations are Johnson Health Tech, Grape King Bio, YungShin, Excelsior Medical, China Chemical, ScinoPharm Taiwan, Standard Chemical, Sinphar Pharm, Formosa Laboratories, and Apex Medical, Johnson Health Tech, Excelsior Medical and Apex Medical of which are selling medical appliances while others are pharmaceutical corporations. Next, 15 experts are invited to apply performance evaluation table to aim at the operating performance evaluating consecutively. Considering the exclusive fluctuate characteristic of industry, the empirical period of operating performance evaluation was from 2013 to 2014. Each expert aimed at 10 corporations evaluating through each sub-criteria. The points were given from 0 to 100. The higher points, the better performance. The points of each sub-criterion obtained by multiplying weight of each sub-criterion at Table 5 and expert's real evaluation, and the total points were the sum of all sub-criteria points. The Table 6 showed as all sub-criteria points in 10 corporations and the ranking of total points.

Table 6. The points of all sub-criteria and the ranking of total points in top 10 of conglomerate revenue in Taiwan biotech corporations

| Criteria | Sub-Criteria | Company | | | | |
|---|---|---|---|---|---|---|
| | (Weight) | Johnson HealthTech | Grape King Bio | YungShin | Excelsior Medical | China Chemical |
| A | A1 (0.1274) | 9.1728 | 9.0879 | 8.2385 | 5.2659 | 5.6905 |
| | A2 (0.0672) | 4.7040 | 4.4352 | 3.8976 | 2.5984 | 2.6432 |
| | A3 (0.0237) | 2.0540 | 1.8170 | 1.3588 | 1.3746 | 1.1218 |
| | A4 (0.0317) | 2.0711 | 2.7473 | 1.9654 | 1.3314 | 1.6061 |
| B | B1 (0.0290) | 1.5660 | 1.2567 | 2.1267 | 0.5413 | 2.1847 |
| | B2 (0.0454) | 3.7228 | 2.1187 | 2.6937 | 2.3305 | 2.3608 |
| | B3 (0.0684) | 5.6088 | 2.7816 | 3.5568 | 4.8792 | 3.2376 |
| | B4 (0.0941) | 7.6535 | 5.2069 | 5.0814 | 3.8895 | 4.7677 |
| | B5 (0.0132) | 1.0736 | 0.8976 | 0.7128 | 1.0208 | 0.6952 |

| | | | | | | |
|---|---|---|---|---|---|---|
| C | C1 (0.0837) | 4.8546 | 5.9706 | 5.1336 | 4.7430 | 4.6872 |
| | C2 (0.1145) | 8.0913 | 10.0760 | 7.3280 | 4.8853 | 5.9540 |
| | C3 (0.0343) | 1.5778 | 1.4635 | 2.0808 | 2.3553 | 2.4696 |
| | C4 (0.0176) | 0.9269 | 0.7627 | 1.0091 | 0.9973 | 0.8448 |
| D | D1 (0.0527) | 2.8458 | 2.5296 | 3.1269 | 4.2862 | 3.5133 |
| | D2 (0.0286) | 2.1736 | 2.0973 | 2.0401 | 1.9829 | 1.9257 |
| | D3 (0.0733) | 6.0106 | 3.0297 | 4.7400 | 5.5219 | 5.1798 |
| | D4 (0.0835) | 6.1233 | 4.6203 | 5.1213 | 5.4553 | 4.8430 |
| | D5 (0.0118) | 0.9597 | 0.9597 | 0.8496 | 0.6215 | 0.6215 |
| Total Score | | 71.1902 | 61.8582 | 61.0612 | 54.0804 | 54.3466 |
| Rank | | 1 | 3 | 4 | 10 | 7 |

Table 6. The points of all sub-criteria and the ranking of total points in top 10 of conglomerate revenue in Taiwan biotech corporations (continued)

| Criteria | Sub-Criteria (Weight) | Company | | | | | |
|---|---|---|---|---|---|---|---|
| | | ScinoPharm Taiwan | Standard Chemical | Sinphar Pharm | Formosa Laboratories | Apex Medical | Mean |
| A | A1 (0.1274) | 4.5015 | 7.1344 | 4.5864 | 6.7947 | 7.7289 | 6.8201 |
| | A2 (0.0672) | 5.7344 | 2.7328 | 2.7776 | 2.5536 | 2.5088 | 3.4586 |
| | A3 (0.0237) | 0.9480 | 1.2324 | 1.0902 | 1.4378 | 1.2640 | 1.3699 |
| | A4 (0.0317) | 1.2891 | 1.8386 | 1.3737 | 1.4582 | 2.3035 | 1.7984 |
| B | B1 (0.0290) | 2.3393 | 2.3393 | 2.4167 | 2.2813 | 1.8947 | 1.8947 |
| | B2 (0.0454) | 2.6635 | 3.0872 | 3.5109 | 2.6937 | 3.9044 | 2.9086 |
| | B3 (0.0684) | 3.1920 | 4.9248 | 5.1528 | 3.0096 | 5.8824 | 4.2226 |
| | B4 (0.0941) | 4.8305 | 5.9597 | 5.5833 | 4.8305 | 7.9044 | 5.5456 |
| | B5 (0.0132) | 0.9680 | 0.6072 | 0.6512 | 0.9064 | 0.6512 | 0.8184 |
| C | C1 (0.0837) | 5.1336 | 5.0220 | 4.6872 | 4.9662 | 4.9104 | 5.0108 |
| | C2 (0.1145) | 4.7327 | 6.7937 | 5.0380 | 5.4197 | 8.5493 | 6.6868 |
| | C3 (0.0343) | 2.4925 | 2.2181 | 2.4239 | 2.2638 | 1.4863 | 2.0832 |
| | C4 (0.0176) | 0.9387 | 1.3611 | 1.2555 | 1.1264 | 1.2437 | 1.0466 |
| D | D1 (0.0527) | 3.5133 | 3.0917 | 2.9512 | 4.0755 | 2.9161 | 3.2850 |
| | D2 (0.0286) | 1.9067 | 1.7923 | 1.6016 | 1.5635 | 1.4872 | 1.8571 |
| | D3 (0.0733) | 5.7174 | 3.0297 | 3.7139 | 3.2252 | 1.7103 | 4.1879 |
| | D4 (0.0835) | 5.3996 | 4.9543 | 4.6203 | 4.7873 | 5.2326 | 5.1158 |
| | D5 (0.0118) | 0.8417 | 0.7552 | 0.7473 | 0.6923 | 0.6215 | 0.7670 |
| Total Score | | 57.1424 | 58.8744 | 54.1816 | 54.0856 | 62.1998 | 58.9020 |
| Rank | | 6 | 5 | 8 | 9 | 2 | |

As Table 6 appeared, the top 10 rankings and total points of operating performance in Taiwan biotech and pharmaceutical incorporations obtained are Johnson Health Tech (71.1902), Apex Medical (62.1998), Grape King Bio (61.8582), YungShin (61.0612), Standard Chemical (58.8744), ScinoPharm Taiwan (57.1424), China Chemical (54.3466), Sinphar Pharm (54.1816), Formosa Laboratories (54.0856) and Excelsior Medical (54.0804) in sequence. Two corporations with the highest points, Johnson Health Tech and Apex Medical, are the manufactures engaged in medical appliances designing, producing, marketing and importing and exporting. Grape King Bio and YungShin Global Holding are the old-brand enterprises with the highest points of operating performance. According to the experts' evaluation, the total points of weighted average from 2013-2014 in 10 Taiwan biotech and pharmaceutical corporations as whole samples is 58.9020. Only the weighted average points of Johnson Health Tech is over 71 and obtained the grade of 'Quite good'. The weighted average points in Apex Medical, Grape King Bio, YungShin, Standard Chemical and ScinoPharm Taiwan are between 57-70, the grade evaluated as 'Slightly good'. In addition, the weighted average points in China Chemical, Sinphar Pharm, Formosa Laboratories and Excelsior Medical are lower than 55, the grade evaluated as 'Average'.

These analyzed empirical results shown the enterprise operating performance in Taiwan biotech and pharmaceutical corporations fell at 'Slightly good' as a whole. Also, the operating performance in partial biotech corporations engaging in medical appliances is higher than pharmaceutical corporations, which appeared the

complexity and diversity as the characteristics in Taiwan biotech and pharmaceutical corporations. These enterprises possess high ambitious of innovation and R&D as well as acquire plenty of outcomes. The integration of different subjects, such as the biotech, medical, computer science and technology, control engineering and electrical engineering is involved in R&D of medical technology. The industry development in different fields furnishes the nutrients for R&D of medical technology. Meanwhile, undeniable, the funds and resources required in order to develop medical technology in Taiwan biotech corporations engaged in medical appliances are unable to compare with international enterprises. Nevertheless, these corporations own their ways to take places in the chain of global medical appliances industry. Compared with other biotech corporations, the input of funds of R&D, manpower and all sorts of resources in Taiwan pharmaceutical corporations are obviously unable to reflect the profitability and operating performance of enterprise. The development of new drugs is the investment with higher risk in particular. In addition, the pharmaceutical corporations encounter more limitations from official policies and acts. Supposing the pharmaceutical corporations only rely on production and selling Generic Drugs as the main business, as well as the profitability of which is probably compromised. However, as far as the current stage concerned, the main financial resource is from traditional operating mode in the pharmaceutical corporations with R&D of new drugs, which is undebatable fact. Additionally, the top 5 rankings of average weighted points of each sub-criterion in all samples are "A1" (6.8201), "C2" (6.6868), "B4" (5.5456), "D4" (5.1158) and "C1" (5.0108) in sequence. The average weighted points of top 5 sub-criteria took up 49.54% of average total points so that the result is similar with the result of weight raking in substance.

## 5. Conclusion

The high proportion of R&D, lengthy period of R&D, high obstacle of industry entry as well as costly R&D expenses occur in Taiwan biotech and pharmaceutical corporations. Encountering industry environment with complete competition, these corporations are bound to value channels and marketing function, emphasize on the management of intellectual property to make use of resources effectively and promote the rewards of investment. Accordingly, how to precisely evaluate the performance with scientificization and datumization is becoming a significant and new issue. On the former related studies of operating performance in Taiwan biotech and pharmaceutical corporations, the researchers mainly made use of DEA and SFA. Yet, these approaches evaluate less variables of enterprise operation unable to present entirely all aspects of enterprise operation. As the result, one innovative thinking and approach is given on this study, which modified Delphi approach, ISM and FANP associate with performance evaluation table to build completely evaluation mode of operating performance in Taiwan biotech and pharmaceutical corporations.

The result of research appeared the significant sequence of criteria is "Product and technology R&D", "Financial performance", "Production and quality management" and "Organization characteristics and operation management". The irreplaceable competitive advantages in the enterprise is transformed by the R&D resources and of products and technology invested by the enterprise and specific results acquired by R&D team, the result of which complies with the current situation in Taiwan biotech and pharmaceutical corporations. In the midst of 18 sub-criteria, the top 5 key sub-criteria influence performance evaluation of corporation operation in biotech and pharmaceutical corporations in Taiwan are "Profitability", "Efficiency of production and cost", "Innovative products and R&D strategies", "Quality management and cost control" and "Operation strategy and business mode". Comparatively speaking, the last 5 key sub-criteria are "Human resources management", "Project management", "Innovation of process technology", "Competence of financial operation" and "Market share". The accumulated weighted point of sub-criteria of top 5 rankings is 50.32% so that these five sub-criteria named key elements as building the mechanism of operating performance evaluation in Taiwan biotech and pharmaceutical corporations. Apparently, the experts tend to evaluate the operating performance of enterprise through the real results rather than the sort of 'input' indicator such as the input of R&D funds, innovative competence and all managerial skills as the significant basis to evaluate the performance.

The top 10 of conglomerate revenue in listed companies taken as the sample of empirical research on this study, including 3 companies with medical appliances and 7 pharmaceutical corporations. The empirical period is from 2013 to 2014 of operating performance evaluation. Two corporations with the highest points, Johnson Health Tech and Apex Medical, are the manufactures engaged in medical appliances designing, producing, marketing and importing and exporting. Grape King Bio and YungShin Global Holding are the old-brand enterprises with the highest points of operating performance. According to the experts' evaluation, the total point of weighted average is 58.9020 of whole sample in complete period in all enterprises, which fell at the grade of 'Slightly good' as a whole. Only Johnson Health Tech obtained the grade of 'Quite good' over 71, weighted average points.

The input of funds of R&D, manpower and all sorts of resources in Taiwan pharmaceutical corporations are obviously unable to reflect the profitability and operating performance of enterprise. Compared with other biotech corporations, the input of funds of R&D, manpower and all sorts of resources in Taiwan pharmaceutical corporations are obviously unable to reflect the profitability and operating performance of enterprise. The development of new drugs is the investment with higher risk in particular. In addition, the pharmaceutical corporations encounter more limitations from official policies and acts.

The evaluated mode of operating performance in Taiwan biotech and pharmaceutical corporations was built precisely and completely with practical attitude on this study. The related results accord with the real situation in the industry. The result of this study is able to be a significant basis as the policies drawn up by government, operating performance evaluated by the enterprise and investment target measured by the investors.

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# Associative Relevance Based Stimulus Shifts Focus in Eye Movements

Gufran Ahmad[1]

[1] Jazan University, Saudi Arabia

Correspondence: Gufran Ahmad, College of Computer Sciences and Information Systems, New Campus, Jazan University, Jazan, 45142, Saudi Arabia. Tel: 966-503-082-048. E-mail: gufran.researcher@gmail.com

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**Abstract**

Recent studies on eye movements have been moving around business demands tremendously. Business scenarios where study of eye movements can boost business prospects, have adapted this promising arena. Equally, tracking eye movements can express the underlying mechanism of visual perception and dynamics of humans' cognition that are of prime concerns for business transactions. In this study, we conducted a series of eye tracking experiments to validate our hypothesis that associated contexts of portrait's elements stimulated shift in focus of eye movements during artistic portrait viewing. We collected the eye movement data of participants who regarded artistic portraits during active viewing. The maps produced from eye tracking system during portrait viewing traced focal links in eye movements on contextual basis. These experimental facts confirmed the hypothesis that associative relevance based stimulus shifted focus in eye movements.

**Keywords:** associative relevance, business, cognition, eye movements, visual focus

## 1. Introduction

### *1.1 Problem Introduction and Significance*

Demanding research studies on eye movements have surpassed and commenced the interdisciplinary domains, newfound views, sophisticated technologies, and wide-ranging applications rapidly. Tracking of eye movements can provide intriguing and meaningful comprehensions of human thoughts and intentions that constitute human behavior and interaction that is indeed necessity not only for research intents but also for business goals. Recently, numerous businesses trading for online sales and shopping, marketing, advertising, and designing are heavily investing and seriously paying attentions for consumer's eye movements because of the purpose to know about consumer's trends and tendencies. By knowing the consumer's minds, the businesses can response their efforts accordingly and competently (Pan et al., 2004; Hermansen, 2015; Bojko, 2013).

Eye movements enable a human to see visible world by visual understanding of surrounding objects as there exist biological links between eyes and human brain. Human's visionary including eye movements for visual insight are neurocognitive mechanism underlying many phenomena. During viewing, the human mind stimulates and evolves cognitive processes include human's sensation, consciousness, visual attention, perception, metacognition, reasoning, analogical thoughts, information processing, and other pertinent processes (Bly & Rumelhart, 1999; Brown, 1999; Duchowski, 2003; Tommasi, Peterson, & Nadel, 2009; Wells, 2000; Ahmad, 2014).

During the process of eye movements, eyes change focuses to spot a specific portion of the visible region in viewing because of having tendency to perceive the degree of detail visible in the central direction of eye gaze or focus. In the movements, they pass through two temporal phases: Fixations (the stops or periods of time when point of focus or significant look is relatively slow) and saccades (the hops between stopping points). Saccades are often information seeking and directed to specific objects or regions by the requirements of ongoing behavior. This infers the existence of cognitive processes of eye movements in viewing as well (Stark & Ellis, 1981; Holsanova, 2008; Snowden, Thompson, & Troscianko, 2012; Rayner, 1992; Tsotsos, 2011; Ahmad, 2015).

### *1.2 Relevant Background and Corresponding Research Design*

Studies on the establishment of coordinated rule between sequenced fixations of eye movement and human activities have moved towards a promising status. The study of relations of fixation sequences to the conduct of

usual human activities has its origin. In fact, intrinsic salience of objects is not accountable for focal shifts in eye movements, but by their relevance to the task or context in hand. In contradiction of free viewing, the eye movements and contextual actions are associative in nature and have a chain of linking. Contextual actions consist of a number of perspectives including an act of associativity within the contexts, elements, or intents (Henderson & Hollingworth, 1998; Hoffman, 1998; Gompel, Fischer, Murray, & Hill, 2007; Duchowski, 2003; Holsanova, 2008).

Moreover, a focused visual representation (spotlight metaphor) facilitates and forms focus of attention in eye movements during pictorial viewing. The locus of directed attention in visual space is supposed as having more illumination than areas to which attention is not directed or areas from which attention has been removed. The spotlight of attention turns off at one location and then on at other. Further, as human's competences for attention and processing for information has limitations cognitively, so it is rather problematic to think about focusing everything at a time. Cognitively, human concentrate attention on small parts, one at a time and similarly, human can focus on only small pieces of information at a time (Gompel, Fischer, Murray, & Hill, 2007; Henderson & Hollingworth, 1998; Hoffman, 1998; Rayner, 1992; Holsanova, 2008).

However, there exist a number of influential factors, which bring flow of thoughts and cognitive mechanisms during the eye movements. We look in a location of portrait that is partly determined by the portrait's constraints and region's informative description, partly by the task, intent, context, or interest. Observers can arrange different visual paths through the same portrait, since they extract information from those parts of the portrait to describe particularly. Therefore, the evolved flow of thoughts cognitively, stimulates the conscious focus of attention to move to the next contextual part of the portrait. This indicates that the underlying stimulus shifts the visual focus of eye movements during portrait viewing according to those influential factors (Henderson & Hollingworth, 1999; Hoffman, 1998; Liversedge, Gilchrist, & Everling, 2011; Stark & Ellis, 1981; Griffin, 2004; Holsanova, 2008).

As we look at a piece of artwork, an enthralling sequence of neurological, perceptual, and cognitive phenomena arises. These phenomena lead us towards our understandability and intellectual capacity about the piece of artwork instantly. In addition, as science is laying its foundation to comprehend our experience about art, in similar manner, the art gives us a view of mind that understands the art. Certainly, we identify that all types of art are one of the most splendid expressions in our lives. It can relax our heart and energize our feelings. Further, artistic understandings arouse deep thoughts as well as all types of emotions. Moreover, an art is a productive activity that focuses on the thoughtful alteration and exaggeration of worldviews. As a rule, all known pieces of art are creative, constructive, and metacognitive as per their roles because of being explicable and self-explanatory. The types and styles of art are technology-driven as innovative technologies bring renaissance to the artworks. The most essential part of an art is its goal or motive to turn out to be conscious and sentient about the art itself, and concurrently, showering sequential cognitive processes in human mind, so that a new-fangled inspiration or perspective may be sensed by adaptive minds of admirers (Solso, 1994; Viegas & Wattenberg, 2007; Turner, 2006; Solso, 2003).

Eye movements process and develop a series of flowing thoughts sequentially to extract information about the portrait or object of interest. These flows of thoughts mostly emanate the opinion of analogy. Though there are a number of perspectives about analogy, yet analogical sense is always available in visual perceptions. Based on available literatures, it gives the impression that the perspective of mapping and the perspective of higher level of perception are two different aspects of the same thing, i.e., analogy (Holsanova, 2008; Gentner, Rattermann, & Forbus, 1993; Gentner, 1983; Gentner & Markman, 1997; Gentner & Medina, 1998; Hofstadter & Sander, 2013).

Associative relevance is evolutionary and cohesive notion, which emanates from thoughts of analogy. Associative relevance is noteworthy phenomenon within cognitive processes. It is an underlying mechanism for creativity and annihilation of complexity during information processing and extraction of information for better understanding of the object of interests. It is an associative chain that links contexts, intents, portions, elements, colors, contrasts, or relations based on similarity or sameness. Further, associative relevance manipulates and generates a stimulus cognitively to associate relative visual contexts. The process of associative relevance originates in the middle of focal shifts during eye movements after the establishments of analogical objects or portions of interest in the active viewing (Gentner, Rattermann, & Forbus, 1993; Bly & Rumelhart, 1999; Gentner & Markman, 1997; Gompel, Fischer, Murray, & Hill, 2007; Ahmad, 2014).

## 2. Method

During artistic portrait observation, we move our eyes freely in unsupervised manner. The viewer's eyes can

change focus from one fixation to another fixation liberally. By recording viewer's eye movements, we obtain a pattern of eye tracks consisting of saccades and fixations or eye focuses. The main motive of this study in artistic portrait viewing is to identify associative relevance and to visualize the associative eye movement patterns.

We investigate the focusing of eye movements from cognitive perspective, including the associative nature of focal shifts, during scene viewing and analyze the patterns of sequenced focusing of eyes to visualize the information. Here, tracking of eye movements, comparing, and visualization of sequenced focusing patterns to extract information for interpretations are essential steps of this study.

Initially, eye movements, in terms of sequenced focuses, are collected from participants who view full-color scenes while engaging in a visual search task in which they are freely viewing different fields of each scene. Finally, we compare and analyze the sequenced focusing against the artistic scene. The underlying inherent associative relevance notions interpret the existing analogical thoughts cognitively in current research.

*2.1 Eye Tracking System*

In eye tracking system, the system illuminates infrared light for tracking the eye movements. The camera, connected to the system, captures the location of viewer's eyes in terms of fixation during experimentation time. As the viewer moves eyes to look a new location of the scene, the camera records new fixation also. This process of recording continues subsequently. The system generates eye movement tracks and heat maps using the captured data. We utilize these data for further analysis.

Figure 1 shows the schematic diagram of eye tracking system and basic processes involved during eye tracking experimentation.

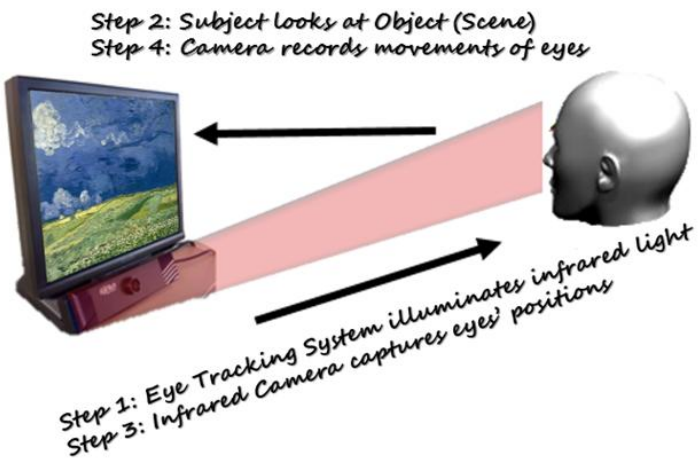


Figure 1. Eye tracking system with operational processes

We take the traces of eye movements in diverse layouts as per analyst's suitability. Among them, there are two most common formats are Heat Map and Sequenced Gazing (focus) with circle of concentration. In Heat Map, we record the track of eye as illumination and intensity of infrared light rays. This is Energy Therapy Technique (ETT) based process. In Sequenced Gazing, the system assigns the eye tracks as numbered circles with their areas indicating the time duration of eye gazing in those areas respectively.

In our experiments, we study the sequenced focusing of viewer's eye movements. The system generates sequenced focusing of viewer's eye movements during scene viewing. These focal shifts are associative relevance based stimuli that propagate during scene viewing.

*2.2 Flow Chart of Study*

The study on eye movements during scene viewing consists of a number of steps. We perform these steps one after the other to complete our study. The flow chart in the below Figure (Figure 2) shows these steps. This is a comparative study of two items; one item is artistic portrait and other item is the eye movement tracks of the same portrait generated from eye tracking system.

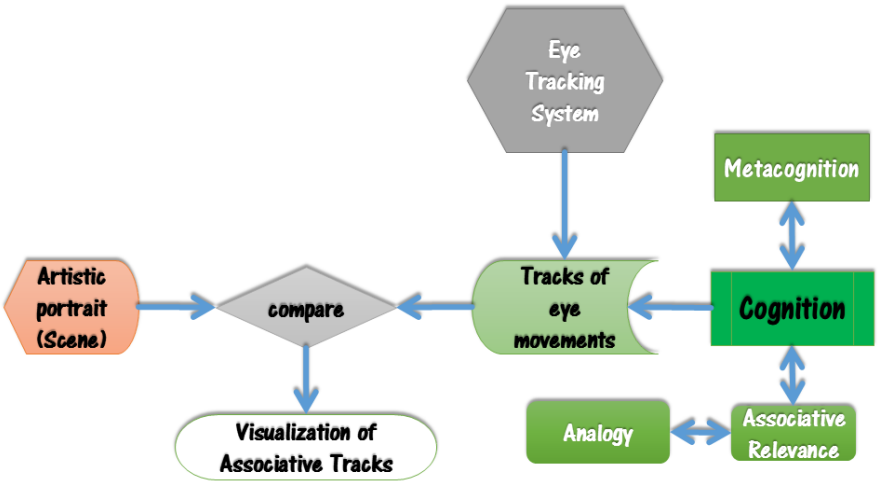


Figure 2. Flow chart of research study

It begins with recording of eye movement tracks for a Subject; a viewer on eye tracking system for an Object; artistic portrait. The generated tracks of eye movement of the same artistic portrait are comparable to the original artistic portrait. This comparative analysis infers visualization and interpretation of the outcome. Therefore, these two items gets a comparison side by side.

During comparison stage, we utilize cognitive process, and metacognitive process, in addition to associative viewpoint of analogy, to understand the hidden mechanism that creates resultant maps. By analyzing, we come up with concluding remarks on evolving phenomena.

*2.3 Experimental Procedure*

We selected 47 participants from a number of fields within university, aging from 20 years to 37 years. These Subjects, the participants watched three randomly selected famous artistic portraits as shown below in Figure 3.

The artistic portraits were “Wheatfield with Cypresses” “Starry Night over the Rhone” and “Wheatfield under Thunderclouds” by Van Gogh.


Figure 3. Selected Artistic Portraits for research study

We closely monitored Subjects’ eye movements as they viewed 32 bits full-color artistic sceneries. A computer monitor displayed the Objects, i.e., the artistic portraits. The shown portraits were at a resolution of 1280 × 1024 pixels, subtended 15 deg. horizontally by 10 deg. vertically. Further, the viewers gazed at the artistic portraits at a viewing distance of 75 cm. Eye position was sampled from an Eye Tech Digital Systems TM3 16 mm Eye Tracker, and eye tracking data was parsed into fixations (circles with focused time-period in areas) and saccades (sequenced focuses with linear edges).

Furthermore, we held the Subject’s head steady in advance prior to experimentations. Prior to the first trial, Subjects completed a procedure to calibrate the output of the eye tracker against spatial positions on the display screen. We repeated this procedure regularly throughout the experiment to maintain high level of accuracy.

Subjects looked at the artistic portraits freely and generously.

Subjects saw the artistic portrait for a short duration of 25 seconds to limit perceivable attentiveness. During this time span, the Subjects viewed the portraits with their normal eyes and focused attention on the Object, i.e., the artistic portrait.

## 3. Analysis

In this phase of analysis, we analyzed all three portraits respectively with the intention to elaborate our findings in the most common and generalized perspective.

### *3.1 Study of Artistic Portrait 'Wheatfield with Cypresses'*

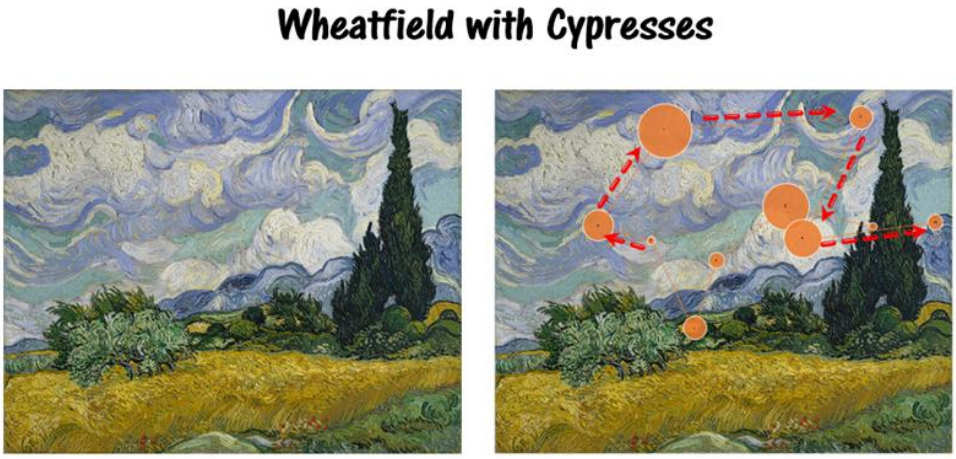


Figure 4. Portrait of 'Wheatfield with Cypresses' and sequenced focuses of the same portrait

In these eye-tracking experiments of Figure 4, the Subject attentively looked at artistic portrait of "Wheatfield with Cypresses" having widely extended Wheatfield along with green trees and bushes, and glossy and whirled clouds, etc. In the beginning, the Subject's sensation brought forward human consciousness to direct them gradually towards visual attention over the glossy and whirled cloud. At this stage, the Subjects perceived knowledge about the field of the portrait, which helped them to move to the next step.

However, the Subject looked at greenery of trees and central hut in the next visual relocation because of existence of cognitive dissonance based on irrelevant flows of cognitive thoughts. This brought the temporal pause in attention due to origin of novel flow of thought in the middle of earlier flow of thought for glossy and whirled cloud. Anyway, previous flow of thought for glossy and whirled cloud dominated again and recovered during the next visual focus of attention in eye movements (Solso, 2003; Turner, 2006; Liversedge, Gilchrist, & Everling, 2011; Solso, 1994).

Afterward, as the focus of attention shifted due to the nature of eye movements for information retrieval, the visual attention focused on glossy and whirled clouds. At this position, the Subject came across cognitively generated stimuli that evolved flows of analogical thoughts. These thoughts derived a sense of associativity among the focused clouds in subsequent movements of eyes. These types of associative chaining among relevant elements, i.e. the glossy and whirled clouds in the artistic portrait arose from cognitively induced factor and analogical thoughts. The glossy color of the clouds had brightness contrast types of associative relevance that cognitively influenced the movements of eyes. As the portion of the portrait was comparatively brighter than the remaining portions of the portrait, the contextual biasing of the visual field of the portrait caused this eye focusing phenomena. Further, whirled shape of the clouds grew stimuli based on associative relevance in their shapes, which propagated the flow of analogical thoughts to move forward in the focus of attention during eye movements.

Later interviews of the Subjects suggested that the visual fields of brightness contrast were the subject of interest to the Subjects. Further, related fields of similarity compelled them to shift their eye focuses dynamically. Moreover, whirled shaped clouds established the portions of interest in the portrait, where these shapes had similarity or sameness. Hence, the conclusion came from undergoing cognitive processes of Subjects' minds in portrait viewing that the associative relevance based stimulus shifts visual focus in eye movements.

*3.2 Study of Artistic Portrait 'Starry Night over the Rhone'*

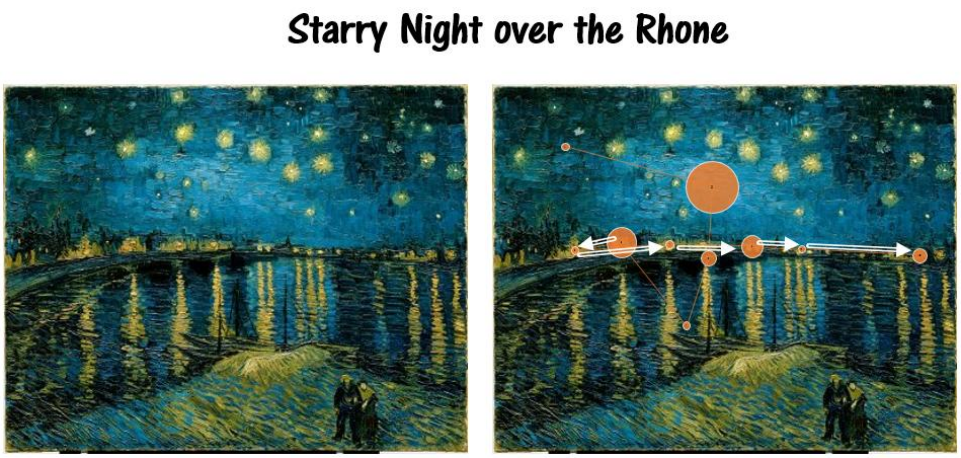


Figure 5. Portrait of 'Starry Night over the Rhone River' and sequenced focuses of the same portrait

In these eye-tracking experiments of Figure 5, we presented an artistic portrait "Starry Night over the Rhone River" which was an artistic expression of a view over Rhone River in a night when the stars were twinkling. In the beginning, the consciousness of the Subject developed visual attention and the Subject started focusing at central brighter field of illuminated sky and persisted there longer for processing information to perceive and retrieve the knowledge. Next, due to top to down scan path consideration, the focus of visual attention moved downwards in the portrait. Here, cognitive dissonance affected the eye movements and diverted from the previous flow of thought related to illuminated sky to newly developed and irrelevant flow of thought (Solso, 2003; Turner, 2006; Solso, 1994; Liversedge, Gilchrist, & Everling, 2011).

However, the temporal pause in previous flow of thought due to cognitive dissonance passed through a recovery phase and retrieved the flow of thought. Subsequently, Subject's visual focus of attention moved to the illuminated source across the river due to the influence of brightness contrast biasing in the visual fields of the portrait. This brings visual perception to the Subjects for the knowledge of context and relevant fields. The existing cognitive process in the human minds enlightened the other coexisting processes, i.e., the process of analogical considerations and the process of linking visual elements of portrait based on associative relevance.

The Subject's visual focus moved towards next contextually biased visual field of the portrait, which was a field of brightness contrast. The process of analogical considerations guided the Subject's visual focus to think about the associative context of visual fields in the portrait, i.e., illuminated sources across the river. Such associative relevance under the basis of brightness contrast originated cognitively generated stimuli that exerted drive to assist visual focus to proceed further in the direction of associatively relevant elements of the portrait. Further, the focal shifts in eye movements reflected this associative relevance based chaining under the influential cognitive processes.

Later interviews of the Subjects realized these facts as well. They narrated that they were actively looking at similar bright regions of the scene because they were excited to know about these immensely lightened fields and the field in the middle of intense light. This inferred the presence of associative relevance based stimuli that shifted the visual focus of eye movements within the artistic portrait.

*3.3 Study of Artistic Portrait 'Wheatfield under Thunderclouds'*

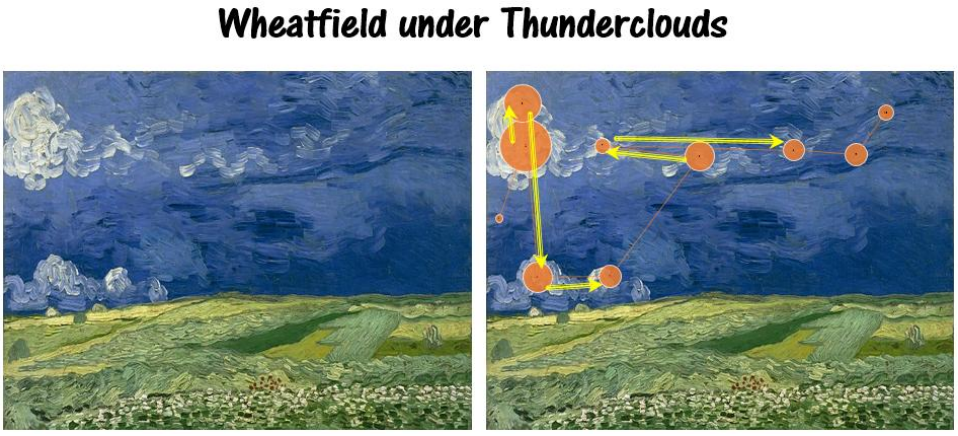


Figure 6. Artistic portrait of 'Wheatfield under Thunderclouds' and the sequenced focuses of the same portrait

In these eye-tracking experiments of Figure 6, we portrayed an artistic portrait "Wheatfield under thundercloud" in which there was a very large filed of harvested wheat crop along with the thundering clouds. In the beginning, Subject's consciousness brought visual attention on dense thundering cloud of relatively more illuminated. The Subject moved the focus of attention towards this cloud due to brightness contrast biasing. At this point, the Subject cognitively initiated information retrieval from the visual field of the portrait. Hence, the Subject came across the phase of visual perception from the element of the portrait and successfully perceived. Next, the Subject changed the visual focus to the adjacent cloud of the same level of brightness contrast. The contextual elements of the portrait revealed consideration of analogy and underlying mechanism of linking based on associative relevance among these elements of the portrait. Such associatively relevant elements of the portrait instigated cognitively structured stimuli that applied impetus over the focus of visual attention to shift towards the next field of relevant interest. Consequently, the visual focus of eye shifted to next illuminated cloud (Solso, 1994; Turner, 2006; Solso, 2003).

Subsequently, by the process of associative relevance based elemental searches within the visual fields of the portrait, the Subjects shifted focuses in sequence to the visual field of related contexts. The process continued and moved towards upper portions of the portrait. Thus, associative relevance based stimulus shifted the visual focus in eye movements during artistic portrait viewing.

Later interviews of the Subjects confirmed their interest in looking for illuminated and thundering clouds. Though they missed in the middle of active seek, yet they were keen to have. The thundering bright clouds were the portions of interest in the artistic portrait. Hence, we observed that these cognitive processes brought a conclusive outcome from the portrait with associative relevance notion over visual fields contextually.

**4. Discussion**

In this study, the artistic portraits cover their reflection with the main objective of artistic artworks in the shape of human cognitive mechanisms in viewing these artistic sceneries. These creative pieces of art manifest inherent human interactions to perceive information and interpretation of realistic world in human mind for understanding. These cognitively shaped emotional outlooks are too problematic to apprehend from data computing and machine based analytics. Consequently, eye movements determine and discover these cognitive perspectives and human thoughts for associative relevance notion in scene viewing (Viegas & Wattenberg, 2007; Tsotsos, 2011; Gompel, Fischer, Murray, & Hill, 2007; Henderson & Hollingworth, 1998).

The shifts in visual focus during artistic portrait viewing are profound steps for proper retrieval of task-relevant visual information, which are the requirements for visualization of final maps generated by eye tracking system. In this study, we notice that the generated eye movement tracks of sequenced focuses are remarkably associative in nature. These are major evidences to verify an association of analogical mapping based on contexts. Further, even a short-term failure of these associative mapping processes of analogical contexts as in the above-mentioned analysis due to cognitive dissonance caused by two irrelevant cognitions within a moment, conveys a completely different outcome for that moment. As a result, without taking account of associative

relevance of analogical mapping, it is impossible to link the entire scenario of human cognition in the sequential eye focusing of eye movement tracks. Further, the origin of associative relevance based stimulus is inseparable entity that has shown its evidence in the experimentations for eye movements.

Choosing an art as an aid to understand underlying mechanism of human cognition is a matter of discussion as well. As a human mind operates to mediate between the environment and the needs of the organism, an artistic creation comes into action to increase consciousness of human mind. Further, various enhanced states of consciousness might be achieved in the future through art, as some experimental means have already undertaken to do. As per available literatures, it is very sure that viewing an artwork can raise human consciousness significantly (Turner, 2006; Solso, 1994; Solso, 2003; Viegas & Wattenberg, 2007).

Furthermore, the reclamation of associative mapping from its deviated scan path stage due to temporary loss of sight or visual color based cognitive effects in addition to cognitive dissonance thoughts during eye movements for visual focal shifts is remarkable from the perspective of its proficiency. This proficiency of repossession is a convinced sign of coherent and consistent associative mapping founded in between the relevant visual fields of the artistic portrait passing through human cognitive processes. These repossessions of associative relevance are efficient of acquiring irreplaceable and unaffected overall outcomes despite unexpected interference during artistic portrait viewing (Griffin, 2004; Stark & Ellis, 1981; Snowden, Thompson, & Troscianko, 2012; Bly & Rumelhart, 1999).

During last stages of experimentations, the visualization of associative relevance of visual contexts in terms of associative eye movement tracks is a strategic and conclusive part of unabridged accomplishments. The visualization of associative eye movement tracks, in terms of associatively relevant visual contexts found in eye movements is unarguably innovative point of view for the specialists who study them for specific intents. Even though the existence of analogical concept and associativity in relevant visual contexts or intents are available in the concerned literatures, yet its manifestation and elucidation contrasts considerably as being different aspects of the same thing. In this regard, the visualization of associative eye movement tracks reveals once more the existence of associative relevance in visual contexts or visual elements of artistic portrait during scene viewing.

Furthermore, the experimental evidence of associative relevance during active portrait viewing holds our hypothesis for which we conducted a series of experimentations. The hypothesis that associative relevance based stimulus shifts visual focus in eye movements is credible, convincing, and innovative creativity related to eye movements study.

## 5. Limitation and Further Research

Although our findings suggested the existence of stimulus based on associative relevance and further, the ability of the stimulus to shift the visual focus of attention during eye movements, yet there were limitations for a detailed model of human visual attention and perception based on analogical thought and associative relevance based notion.

In future, we concentrate our research in the direction of a generalized model for human visual attention and perception based on the influential factors like, associative relevance based stimulus, analogical thinking, and other essential factors. In addition, we converge our experimentations for better scenarios, so that we may understand the detailed illustration of cognitively generated dynamics of human visual perception and inherent processes during eye movements.

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# Energy Efficiency Estimation Based on Bayesian Method and Industrial Economic Transition: Taking Shandong as an Example

Yingying Wu[1]

[1] School of Business, Shandong Normal University, Jinan, China

Correspondence: Yingying Wu, Business School of Shandong Normal University, Jinan, China. E-mail: 38233778@qq.com

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**Abstract**

This paper studied the total factor energy efficiency of industrial sector's in Shandong. First, theoretical models of stochastic frontier approach on energy efficiency were structured, and then the referred parameters were estimated by using panel data of thirty-seven industries in Shandong from 2006 to 2013 and Bayesian estimation method. Finally Tobit model was applied to empirically study the influencing factors on energy efficiency of industrial sector's. The study indicates that: (1) The input of capital and energy is notably positively correlative to output, while the input of labor quantity is negatively correlative to output. This means labor redundancy exist in industrial sectors. (2) Chemical industry, machinery industry, equipment manufacturing industry and food processing industry which have high energy efficiency should be further developed, especially marine chemical industry and marine biological medicine should be focused on to realize traditional industry upgrading. (3) Enterprise scale, international trade, the level of foreign investment and technology progress are notably positively relative to energy efficiency, while the proportion of state-owned economy have negative impact on energy efficiency. Therefore, it is necessary for further improvement in industrial energy efficiency in Shandong to decrease the proportion of stated-owned, encourage private capital entrance, extend opening up, and speed up the technical innovation.

**Keywords:** resource economics, total factor energy efficiency, stochastic frontier model, influencing factor

## 1. Introduction

At present, the contradiction among energy, economics and environment is increasingly serious in China. Chinese government had declared saving target of a 40-45 percent reduction in $co_2$ emission unit of GDP by the end of 2020 than 2005. Improving energy efficiency and realizing saving target has become the important question for all regions, among which Shandong has faced huge pressure. Economic growth of Shandong excessively depended on industry sectors, especially heavy industry with the features of high energy consumption and high $CO_2$ emission, which don't contribute to realize saving target. The paper studies the influencing factors on energy efficiency on the base of measuring the energy efficiency of all industries in Shandong, and combining with the strategy of blue economic zone and yellow river delta proposes some suggestions about industry structure adjustment to transform traditional manufacturing industry to modern manufacturing industry.

Energy efficiency can be divided into economic efficiency and technical efficiency. The paper takes economic efficiency as subject. The studies about energy efficiency focus on energy efficiency condition of some region, difference of energy efficiency, influencing factors of energy efficiency, etc. Among these studies, the definition of energy efficiency is changed from single factor energy efficiency (SFEE) to total factor energy efficiency (TFEE), and the main research methods include factor decomposition method (FDM), data envelopment analysis (DEA) and stochastic frontier approach (SFA), etc.

FDM is the main research method in earlier studies on single factor energy efficiency, which is defined as energy consumption per unite of output, and that is energy intensity. Many researchers decomposed change of single factor energy efficiency based on complete decomposition raised by sun (1998). The calculation of SFEE is easy, while it ignores that energy is only one kind among many input factors, which must combine with other production factors such as capital and labor to bring output (Boyd & Pang, 2000). Therefore, more and more studies focus on energy efficiency considering other factors of labor and capital, which is called TFEE. In this

field, there are two methods of parametric and non-parametric analysis. Parametric analysis include Stochastic Frontier and Deterministic Frontier analysis, and the former is more common. DEA is the main representative of Non-parametric analysis (Yang, 2009). The value of energy efficiency calculated by DEA is positive which measures actual output/maximum output under the same input or minimum input/actual input under the same output.

DEA doesn't define the specific form of production function in advance, while parametric analysis represented by SFA need estimate the production frontier by econometric regression method considering the influence of random factors. This method was presented by Meeusen and Broeck in 1977, and perfected by Jondrow in 1982. Compared with DEA, the research used SFA in energy efficiency is lack. Shidan (2008) measured the energy efficiency difference among Chinese provinces adopting SFA in 2008, which expands the traditional research idea of relying on index decomposition method in energy efficiency studies.

Compared with this two methods, DEA regards the deviation of decision unit from production frontier as its own technical efficiency results, while SFA decomposes the deviate into technical efficiency and random disturbance. Therefore, when the change of energy efficiency includes the random disturbance that DEA doesn't reflect, especially when the production frontier unit is affected strongly by random factors, the error of TFEE measured by DEA is very big. Based on the above, the study adopts SFA determining production frontier. In the existing referred research, major of SFA takes MLE or OLS method to estimate parameters. This paper takes Bayesian estimation method to estimate all parameters in frontier production function, then calculates the value of TFEE which is an innovation of this paper.

At present, there is lack of studies on energy efficiency of industrial sector's of Shandong. This paper makes a contribution to this field. Firstly, theoretical models of SFA on energy efficiency are structured, and then the referred parameters are estimated by using panel data of thirty-seven industries in Shandong from 2006 to 2013 and Bayesian estimation method. Finally Tobit model is applied to empirically study the influencing factors on energy efficiency of industrial sector's.

This study proceeds as follows. Section 2 explains the methodology. Section 3 describes the corresponding data. Section 4 presents the empirical results and policy implications. Section 5 concludes.

## 2. Methodology

### *2.1 SFA Model*

Cobb-Douglas and translog functions are usually used in SFA, and the former is easier and convenient to be estimated and decomposed. This paper adopts Cobb-Douglas function to establish theoretical models as follows:

$$\ln y_{it} = \beta_0 + \sum_i \beta_i \ln x_{it} + v_{it} - u_{it} \tag{1}$$

$$TE_{it} = y_{it} / \exp[\beta_0 + \sum_i \beta_i \ln x_{it} + v_{it}] = \exp(-u_{it}) \tag{2}$$

Here $y_{it}$ is output, $x_{it}$ is input. $v_{it}$ is random disturbance, and $v_{it}$~N $(0, \sigma^2)$. The variable of $u_{it}$ is production inefficiency item, representing production efficiency or management efficiency, and it is usually assumed as exponential random variable or half normal random variable following independent and same distribution. $U_{it}$ is independent of $v_{it}$. $TE_{it}$ is TFEE this paper studies.

Compared with Cobb-Douglas function, the form of translog function is more flexible which can be regarded similarly as any production function. This paper will calculate respectively the efficiency value under this two forms, and choose that with high DIC value.

### *2.2 Bayesian Estimation Method*

This paper takes Bayesian estimation method presented by Van Den Broeck (1994), Koop, Steel, and Osievalski (1995) (VKSO) to estimate Eq. (1). According to VKSO, some assumption needs be set as following: $y_{it}$~iidN $(\alpha+\beta x_{it}'-u_{it},\sigma^2)$, $\alpha$~iidN $(0,\sigma_\alpha^2)$, $\beta$~iidN $(0,\sigma_\beta^2)$. Based on the past literature, $\sigma_\alpha^2 = \sigma_\beta^2 = 1.0E\text{-}6$.

Further, the study assumes $u_{it}$ following exponential distribution with parameter of $\theta$. According to the former research, the factors influencing energy efficiency include the degree of competition, technology progress and institutional reform. This paper chooses those indexes as following: industry scale (comp), the percentage of gross output value of state-owned in total gross industrial output value(state), the percentage of gross output value of foreign-funded enterprises in total gross industrial output value (priva), the percentage of export delivery value in total gross industrial output (expt), the percentage of expenditure on R&D in industrial added

value (rd). Thus, we get Eq. (3).

$$\theta = exp\left(r_0 + r_1 comp + r_2 state + r_3 priva + r_4 expt + r_5 rd\right) \quad (3)$$

Further the paper assumes θ following exponential distribution with parameter of -log(r*), and r* is prior median of technological efficiency. This paper gets r* = 0.875 by taking the traditional SFA method and the sfpanel command in stata. Finally, the paper assumes $\sigma^{-2}$~iidG ($\alpha_0$,$\alpha_1$), and we can get $\alpha_0=\alpha_1$=1.0E-3 according to the conclusion of Griffn and Steel (2007).

*2.3 Tobit Model*

$$eff_{i,t} = \beta_0 + \beta_1 lncomp_{i,t} + \beta_2 lnstate_{i,t} + \beta_3 lnpriva_{i,t} + \beta_4 lnexpt_{i,t} + \beta_5 lnrd_{i,t} \quad (4)$$

Based on the value of energy efficiency calculated above, Tobit model is structured to analyze influencing factors impacted on energy efficiency.

## 3. Data

This paper adopts data of thirty-seven industries in Shandong from 2006 to 2013 excluded two industries of Mining and Dressing of Other Ores and Manufacture of Automotive. To estimate TFEE, the referred data includes input and output data. Input data includes capital quantity (k), energy consumption (e), labor quantity (l). Industrial added value is applied as output variable. The above data is all converted into constant price of 2006. In Tobit model, i represents industry sector, and t represents time. $Comp_{i,t}$ is industry scale calculated by gross industrial output value/enterprise number. $State_{i,t}$ represents the percentage of gross output value of state-owned in total gross industrial output value. $Priva_{i,t}$ represents the percentage of gross output value of foreign-funded enterprises in total gross industrial output value. $Expt_{i,t}$ represents the percentage of export delivery value in total gross industrial output. $Rd_{i,t}$ represents the percentage of expenditure on R & D in industrial added value. The data in this paper are all from Shandong Statistical Yearbook (1995-2014).

## 4. Empirical Results

This paper uses Winbugs soft to finish Bayesian SFA estimation. The result shows that DIC of translog function is bigger than Cobb-Douglas function, therefore the later is more suitable. Fig 1 shows the convergence trajectory of parameter $\beta_1$ which proves that Markov chain monte carlo converge.

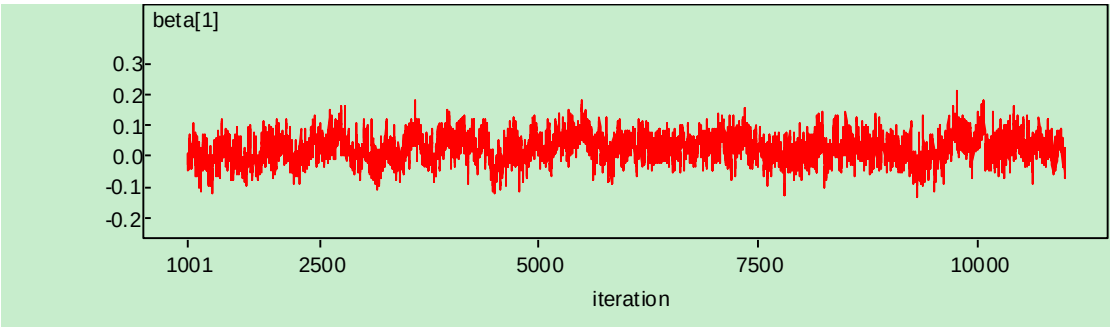


Figure 1. The convergence trajectory of parameter $\beta_1$

Table 1 shows that Bayesian estimation results of SFA. We find that input quantity of capital and energy are positive to output, while labor quantity has negative effect to output which proves that surplus labor exist in industrial sectors.

Table 1. The Bayesian estimation results of SFA

| Variables | Coefficient | Mean value | Standard diviation | MC error | 2.5% | 97.50% |
|---|---|---|---|---|---|---|
| lne | $\beta_1$ | 0.02605 | 0.04392 | 0.002372 | -0.0597 | 0.1104 |
| lnl | $\beta_2$ | -0.4024 | 0.05921 | 0.003207 | -0.5223 | -0.2874 |
| lnk | $\beta_3$ | 0.7058 | 0.0481 | 0.001919 | 0.6099 | 0.7983 |

Table 2. TFEE and groups of thirty-seven industries of Shandong from 2006 to 2013

| Industry sector | TFEE | Standard deviation | Grouped according to TFEE | Grouped according to industrial added value |
|---|---|---|---|---|
| Manufacture of Raw Chemical Materials and Chemical Products | 0.975 | 0.005 | I | I |
| Processing of Farm and Sideline Food | 0.969 | 0.010 | I | II |
| Textile Industry | 0.967 | 0.010 | I | II |
| Smelting and Pressing of Ferrous Metals | 0.961 | 0.009 | I | II |
| Manufacture of Special Purpose Machinery | 0.958 | 0.017 | I | II |
| Mining and Washing of Coal | 0.951 | 0.011 | I | III |
| Production and Supply of Electric Power and Heating Power | 0.946 | 0.022 | I | III |
| Smelting and Pressing of Nonferrous Metals | 0.945 | 0.018 | I | II |
| Manufacture of Electrical Machinery & Equipment | 0.944 | 0.013 | I | II |
| Manufacture of Computer, Communications and | 0.937 | 0.014 | I | II |
| Manufacture of General Purpose Machinery | 0.930 | 0.005 | I | III |
| Manufacture of Metal Products | 0.928 | 0.010 | I | III |
| Manufacture of Railroad,Marine,Aerospace and Other Transportation Equipment | 0.927 | 0.043 | I | II |
| Papermaking and Paper Products | 0.925 | 0.021 | I | III |
| Petroleum Refining, Coking and Nuclear Fuel Processing | 0.921 | 0.007 | I | III |
| Manufacture of Textile Wearing Apparel and Finery | 0.921 | 0.015 | I | III |
| Extraction of Petroleum and Natural Gas | 0.914 | 0.046 | I | III |
| Manufacture of Rubber and Plastic | 0.912 | 0.004 | I | III |
| Manufacture of Food | 0.911 | 0.023 | I | III |
| Nonmetal Mineral Products | 0.910 | 0.022 | I | III |
| Manufacture of Medicines | 0.906 | 0.012 | I | III |
| Timber Processing, Bamboo, Cane, Palm Fiber & Straw Products | 0.877 | 0.017 | II | III |
| Manufacture of Wine, Drinks and Refined Tea | 0.865 | 0.024 | II | III |
| Manufacture of Leather, Fur, Feather & Its Products and Footwear | 0.858 | 0.027 | II | III |
| Manufacture of Culture, Education,Arts and crafts,Sport and Entertainment Goods | 0.837 | 0.022 | III | III |
| Other Manufacture | 0.829 | 0.085 | III | III |
| Manufacture of Furniture | 0.818 | 0.020 | III | III |
| Mining and Dressing of Nonmetal Ores | 0.808 | 0.033 | III | III |
| Mining and Dressing of Nonferrous Metals Ores | 0.804 | 0.024 | III | III |
| Printing, Reproduction of Recording Media | 0.790 | 0.017 | III | III |
| Mining and Dressing of Ferrous Metal Ores | 0.789 | 0.017 | III | III |
| Manufacture of Measuring Instrument | 0.780 | 0.029 | III | III |
| Production and Supply of Tap Water | 0.777 | 0.034 | IV | III |
| Manufacture of Chemical Fibers | 0.753 | 0.049 | IV | III |
| Production and Supply of Gas | 0.746 | 0.028 | IV | III |
| Tobacco Products | 0.730 | 0.036 | IV | III |
| Comprehensive Utilization of Waste Repair Industry | 0.668 | 0.055 | IV | III |

According to the results in Table 2, some suggestion are given: Firstly, for those main industries such as Manufacture of Raw Chemical Materials, Manufacture of Electrical Machinery & Equipment, Manufacture of Food, marine industry should be focused on developing rapidly marine chemical materials, manufacture of marine machinery, manufacture of marine food. Combining with the strategy of blue economic zone, marine industry clusters should establish to upgrade traditional industries. Secondly, based on yellow river delta strategy,

Manufacture of Computer and Communications, biological engineering, new materials and other high-tech industries should be fostered to form scale effect. Thirdly, for regions in Lunan, food processing industry should be regarded as emphases, take high-end products as goal to develop the deep processing of peanut and soybean oil, vegetables, fruit, animal husbandry, etc.

Table 3. Tobit model estimation result of the influencing factors of energy efficiency of industries in Shandong and Robust test

| Variables | Model I | Model II | Model III |
|---|---|---|---|
| $lncomp_{i,t}$ | 0.019*** | 0.038*** | 0.032*** |
| | (0.005) | (0.006) | (0.006) |
| $lnstate_{i,t}$ | -0.011*** | -0.001* | -0.008* |
| | (0.003) | (0.003) | (0.004) |
| $lnexpt_{i,t}$ | | 0.011*** | 0.008*** |
| | | (0.002) | (0.002) |
| $lnpriva_{i,t}$ | | 0.003* | 0.005* |
| | | (0.004) | (0.004) |
| $lnrd_{i,t}$ | | | 0.011*** |
| | | | (0.003) |
| cons | 0.669*** | 0.557*** | 0.652*** |
| | (0.058) | (0.063) | (0.067) |
| /sigma | 0.077 | 0.067 | 0.066 |
| | (0.003) | (0.003) | (0.003) |
| Log likelihood values | 320.682 | 331.804 | 336.546 |

*Note*. *, **, *** represent significance above 10%, 5%, 1%, respectively.

Empirical results of Tobit model in Table 3 shows that enterprise scale, international trade, the level of foreign investment and technology progress are notably positively relative to energy efficiency, while the proportion of state-owned economy have negative impact on energy efficiency. Therefore, it is necessary for further improvement in industrial energy efficiency in Shandong to decrease the proportion of stated-owned, encourage private capital entrance, extend opening up, and speed up the technical innovation.

## 4. Conclusion

This paper studied the total factor energy efficiency of industrial sector's in Shandong. First, theoretical models of stochastic frontier approach on energy efficiency were structured, and then the referred parameters were estimated by using panel data of thirty-seven industries in Shandong from 2006 to 2013 and Bayesian estimation method. Finally Tobit model was applied to empirically study the influencing factors on energy efficiency of industrial sector's. The study indicates that: (1) The input of capital and energy is notably positive correlative to output, while the input of labor quantity is negative correlative to output. This means labor redundancy exists in industrial sectors. (2) Chemical industry, machinery industry, equipment manufacturing industry and food processing industry which have high energy efficiency should be further developed, especially marine chemical industry and marine biological medicine should be focused on to realize traditional industry upgrading. (3) Enterprise scale, international trade, the level of foreign investment and technology progress are notably positive relative to energy efficiency, while the proportion of state-owned economy have negative impact on energy efficiency. Therefore, it is necessary for further improvement in industrial energy efficiency in Shandong to decrease the proportion of stated-owned, encourage private capital entrance, extend opening up, and speed up the technical innovation.

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# Does the Risk of Managerial Entrenchment Affect CEO Dismissal in Family SMEs?

Jonathan Bauweraerts[1] & Olivier Colot[1]

[1] Warocqué School of Economics and Management, University of Mons, Mons, Belgium

Correspondence: Jonathan Bauweraerts, Warocqué School of Economics and Management, University of Mons, Place Warocqué, 17, 7000, Mons, Belgium. Tel: 32-65-37-32-76. E-mail: jonathan.bauweraerts@umons.ac.be

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**Abstract**

The aim of this study is to identify the determinants of CEO dismissal in Belgian family SMEs. Based on a survey launched to 2.000 SMEs, 102 CEO dismissals were identified as well as other relevant features related to the family character of the firm. Logistic regressions have been used to explain CEO dismissal by several variables related to governance. The results indicate a significant influence of CEO attributes such as age and tenure on CEO dismissal. Also, firm age has been shown to enhance CEO dismissal. The other governance variables do not lead to significant findings. Taken together, these results suggest that specific risks of managerial entrenchment can explain CEO turnover in the context of family SMEs.

**Keywords:** CEO dismissal, family firms, corporate governance, managerial entrenchment

## 1. Introduction

This article investigates the impact of the risk of managerial entrenchment on the likelihood of CEO dismissal in the context of family SMEs. Prior research has mainly focused on listed family firms in Anglo-Saxon countries where ownership dispersion is high and managerial control is inefficient. As a result, the findings are difficultly generalizable to other contexts. In this study, we try to offer a more nuanced view of managerial entrenchment by focusing on Belgian family SMEs. This approach appears relevant for several reasons. First, the Belgian market has not received considerable attention from the literature (Voordeckers et al., 2007). Exploring managerial entrenchment on this market is particularly interesting as two governance models overlap: the Germano-Nippon model in the northern part of Belgium and a mixed model in the southern part. Moreover, entrenchment has often been considered as a negative phenomenon after Fama and Jensen's (1983) works that emphasize the maximization of managers' utility function at the expense of shareholders. By focusing on family SMEs, we investigate an organizational context where the alignment of interests between family owners and managers is more likely to be observed. By so doing, our study offers a contribution to the academic literature which urges scholars to contextualize governance research in the family business field (Nordqvist et al., 2014). Furthermore, we try to link different features of managerial entrenchment with CEO dismissal in order to determine whether entrenchment increases the likelihood that top executives keep their position in these organizations. By so doing, we offer a more nuanced view of managerial entrenchment which has been claimed to lead to inefficient decision-making processes (Bauweraerts & Colot, 2014).

### *1.1 Agency Theory and Managerial Entrenchment in Family Firms*

Agency theory analyses the conflicts that can occur between owners and managers, each of these stakeholders trying to maximize his/her utility function. According to the classical Anglo-Saxon view, managers have a long term vision of the company because of the contractual relation that binds them to the firm. Their objectives are to maintain their power in the organization and to maximize their compensation. In contrast, shareholders have a short term vision of the company as they want to maximize the return on investment the fastest possible. However, this conceptual framework remains general. Accordingly, the underlying hypotheses can drastically change depending on the context in which the firm evolves.

This area of research has been developed by Shleifer and Vishny (1989) and by Paquerot (1996) for the French market. The latter puts into perspective three phases during the entrenchment process: A valorization phase, a control-reducing phase and a consumption phase. This classical and rectilinear process supposes that managers

use all flaws in the governance structure to extend their discretionary space and their managerial latitude in order to maximize their personal consumption. In that sense, Pigé (1998) showed that managerial entrenchment enables managers to free themselves from the supervision of the board of directors and the shareholders. This situation offers them a higher degree of freedom to take decisions and greater job security. However, do managers really adopt opportunistic behaviors? Two main streams are contradictory (Kesten, 2010). On the one hand, the dark side of managerial entrenchment indicates that managers pursue strategies and circumvent control mechanisms in order to extend their discretionary space and to divert resources at the expense of stakeholders. On the other hand, stewardship theory explains that managers would be trustworthy servants devoted to the interests of all stakeholders (Maati, 1999). According to this view, stakeholders have to encourage them in their actions to create value. In consequence, the bright side of managerial entrenchment would lead to organizational effectiveness (Charreaux, 1997). While several scholars empirically showed that managerial entrenchment has a negative impact on shareholders' wealth (Bedchuck et al., 2009; Gompers et al., 2010), Kesten (2010) reported that the dark side of managerial entrenchment tends to disappear since the 2007 financial crisis. He observed that the companies with relatively high degrees of managerial entrenchment outperform those with a lower degree of entrenchment. In addition, Schulze et al. (2001) demonstrated the importance of considering agency problems within family SMEs. They suggest that family firms could also suffer from opportunistic behaviors from family owners. Especially, additional costs resulting from altruistic attitudes can replace the classical agency costs between owners and managers. Moreover, they affirm that agency problems can not be easily solved through economic incentives since family members are already the residual owners of the company. Accordingly, family firms often face altruism problems that take the form of self-control problems that threaten the family and firm wealth (Schulze et al., 2003). In sum, managerial entrenchment as well as altruism and shared values can constitute an impediment to organizational effectiveness in family SMEs (Bauweraerts & Colot, 2012).

### *1.2 What are the Risks of Managerial Entrenchment in Family Firms?*

Managerial entrenchment takes two forms in family firms. Indeed, it could exist an entrenchment of the family owner-manager, but also a family entrenchment that exerts an influence after the retirement of the incumbent CEO (Allouche & Amann, 2002). In that vein, several scholars argue that the entrepreneurial spirit is difficult to be passed onto the next generations (Jaskiewicz et al., 2015). As such, it would be easier for family descendants to create value through the use of their influence by extracting the company wealth rather than engaging in innovation. Following the same line, Allouche and Amann (2002) reported that the dark side of family entrenchment is more important when the proportion of shares held by family managers increases. In that situation, controlling family managers becomes complicated because of the nature of the family relationships which are likely to induce a bias regarding the competences of the family manager. Thus, the question is to determine the circumstances that create the conditions for the bright side (Castenias & Helfat, 1991; Charreaux, 1997; Anderson & Reeb, 2003; Isako & Weisskopf, 2009) and the dark side (Morck et al., 1988; Shleiffer & Vishny, 1989; Gallo & Vilaseca, 1996; Schulze et al., 2001; Gomez-Mejia et al., 2001) to emerge.

Several studies have investigated the risks of family entrenchment and how it affects family firm performance and sustainability. Targeting family firms listed on the Fortune 500, Villalonga and Amit (2004) showed that family ownership is positively related to performance provided that the founder is also the CEO or the chairman of the board, agency problems only occurring at the second generation. Andres (2008) underlined that family firms display higher levels of performance when the family is actively involved in the top management team and/or the board of directors. Isako and Weisskopf (2009) brought evidence that family firms led by a descendent CEO who is also the chairman of the board display superior market and accounting performance.

However, Miller et al. (2007) revealed that the results obtained with large companies do not necessarily apply to smaller firms. They argue that family firms do not systematically outperform their nonfamily peers, which would explain the presence of nonfamily firms on the market. In that sense, Kowalewski et al. (2010) showed a neutral effect of family ownership on ROA over the period 1996-2004. They also find that having a family member as CEO and/or chairman of the board does not significantly affect family firm performance. Considering the Asian market, Peng and Jiang (2006) indicated that the influence of family entrenchment on performance depends on market regulations and institutional constraints.

Hillier and Mac Colgan (2005) highlights that, in comparison to nonfamily managers, family executives are less likely to be dismissed in case of poor performance on the London Stock Exchange. These results tend to indicate that the overlap of ownership and management stimulates altruistic and self-serving behaviors, which seems to confirm the dark side of family entrenchment (Giovannini, 2010; Kowalewski et al., 2010). Furthermore, other studies reveal a negative impact of family entrenchment on family firm performance. Chang and Zhang (2010) showed that family entrenchment (measured by a six-item scale) negatively affects Tobin Q on the American stock

exchange over the period 1990-2007. In the same vein, Surroca and Tribo (2008) found that family entrenchment is detrimental to firm financial performance while the opposite for social activities that nurture the family socio-emotional wealth.

Based on the abovementioned studies, we observe that managerial entrenchment in family firms has mainly been investigated in the context of listed companies. The findings are relatively contrasted and sometimes contradictory. Consequently, it is impossible to have a unique vision about the impact of managerial entrenchment within family firms. This lack of homogeneity in the results and the prior focus on listed firms led us to explore both sides of family entrenchment in family SMEs.

A common assumption that could be made about managerial entrenchment in family SMEs is that it would naturally be stronger. Indeed, the ownership structure of family SMEs is characterized by concentrated ownership in the hands of the family and the presence of external investors is rather rare. Moreover, SMEs are not obliged to disclose information related to the compliance with corporate governance principles. Due to this opacity, the market for corporate control has a lower impact on the governance structure of family SMEs (Lubatkin et al., 2005). As a result, the likelihood that family managers are entrenched would be higher in this type of organization. Thus, family SMEs would represent an appropriate setting to explore managerial entrenchment: If managerial entrenchment is as negative as predicted by the classical theory, family SMEs should, on average, underperform their nonfamily peers.

Several arguments can explain this negative view of managerial entrenchment. First, family managers are more inclined to pursue the family agenda and to perpetuate the family legacy across generations (Berrone et al., 2012), which makes family managers difficult to replace. As a consequence, family SMEs would be less reactive in managerial succession when performance is poor. Also, they often possess tacit knowledge which is difficult to transmit to other managers in order to ensure organizational effectiveness (Mousa & Wales, 2013). Furthermore, corporate governance is often ineffective owing to the significant involvement of family members in governance bodies. For instance, family CEO often occupy the position of chairman and outside directors are rarely welcomed to seat on the board (Bammens et al., 2008). Consequently, family SMEs would have some difficulties to benefit from an effective control and intellectual resources from outsiders (Daily & Schwenk, 1996).

Owing to the centrality of family managers in the entrenchment process within family SMEs, we mainly focus on their specific attributes. This perspective is in line with the theoretical development of Hambrick and Mason (1984) as well as Smith et al. (1994) who stressed the importance of managers' attributes to understand organizational effectiveness. Goll (2011) found empirical evidence for this conceptual framework by showing a direct relationship between managers' demographic characteristics and performance. These contributions clearly illustrate the contributive value of managers (through their attributes) to the value creation process and/or the reinforcement of their entrenchment. (Zenou, 2006).

In this study, the general assumption is that the risk of managerial entrenchment will prevail in family SMEs. However, it is not necessarily the dark side that will express, such that higher degree of managerial entrenchment will not necessarily lead to organizational inertia in terms of CEO turnover.

*1.3 Hypotheses Development*

This research focuses on family SMEs which are not obliged to disclose operational information over corporate governance. As a result, we focus on the following variables that are generally used to assess managerial entrenchment (Huybrechts et al., 2013; Bauweraerts & Colot, 2014):

- CEO age;
- CEO tenure;
- Family ownership;
- CEO duality;
- Firm age;
- Number of managers.

First, we are going to focus on CEO age and tenure which have been shown to be hardly dissociable. Although several studies point out the positive impact of CEO age and tenure on the value creation process (Hambrick & Mason, 1984; Boeker, 1997), others challenge this linear causality model and suggest that the relationship between these CEO attributes and value creation is rather curvilinear (Paquerot, 1996; Hambrick & Fukutomi, 1991). As such, CEO age and tenure will have a positive impact on performance until a certain threshold after which an increase in these variables becomes detrimental to organizational effectiveness.

The positive linear relationship can be explained by several arguments. It can be argued that older CEOs are more likely to have built social ties with numerous stakeholders that offer a positive contribution to firm performance. Moreover, older and longer tenured CEOs often possess more experience, which would be very helpful to realize specific investments with positive returns. According to this perspective, CEO age and tenure could enhance the bright side of managerial entrenchment.

Beyond this positive view, an alternative vision can be proposed. Indeed, older and longer tenured CEOs can also stimulate the dark side of managerial entrenchment. Following Shleifer and Vishny's (1989) classical theory, it would be easier for older and longer tenured CEOs to circumvent governance controls, such that they can take specific decisions that other managers will not be able to implement correctly. At the same time, CEOs honor implicit contracts with internal stakeholders in order to extend their power in the firm to make them irreplaceable. In that sense, Brockman and Thistle (2009) reported that CEO tenure is positively related to his/her ownership stake in the firm and his/her compensation. These authors also claim that firm value tends to decrease when CEO tenure and age increase since it becomes more complicated to remove him/her from the decision-making process. It is harder to rule out the CEO as he/she builds his/her reputational capital over time and can benefit from internal and external support to keep his/her job (Finkelstein, 1992). In line with these studies, Basly (2006) found that firm sustainability can be altered by excessive conservatism and strong affective attachment, which is likely to be reinforced when CEO tenure and age increase. All these studies seem to indicate that older and longer tenured CEOs are less likely to be dismissed even if the firm underperforms its competitors. For these reasons, the following hypotheses are proposed:

*H1: CEO age is negatively related to the likelihood of CEO dismissal.*

*H2: CEO tenure is negatively related to the likelihood of CEO dismissal.*

Another important factor that could have an impact on the likelihood of CEO dismissal is the ownership stake in the hands of a family. Indeed, family owners are often more inclined to perpetuate the family legacy and are thus more inclined to maintain a family member at the helm of the company independently from economic considerations (Berrone et al., 2012). Also, family CEO often display a strong emotional attachment to the organization (Gomez-Mejia et al., 2007). As a result, they would be less inclined to leave his/her position. Yet, they possess specific knowledge about the business, which makes them particularly difficult to replace even if they exhibit poor performance (Mousa & Wales, 2013). In sum, family owners would show a greater propensity to maintain a family CEO as it serves them to ensure that their socioemotional and economic needs are fulfilled (Naldi et al., 2013). For these reasons, the following hypothesis is posed:

*H3: Family ownership is negatively related to the likelihood of CEO dismissal.*

CEO can also possess an ownership stake in the firm. In that case, he would have greater power in the organization and he would benefit from a greater managerial latitude to take decisions. As such, control procedures are less effective and it is more likely that the CEO remains at the helm of company despite poor performance. Therefore, the following hypothesis is suggested:

*H4: CEO duality is negatively related to the likelihood of CEO dismissal.*

Firm age can also exerts an influence on the likelihood of CEO dismissal. As this variable is often correlated to CEO age, the same reasoning used to develop hypothesis 1 prevails. As such, we suggest:

*H5: Firm age is negatively related to the likelihood of CEO dismissal.*

As it was not possible to obtain operational information related to board composition and functioning, we consider the supervision of managers as a control mechanism. The number of managers in the top management team was used to assess monitoring. Theoretically, a greater proportion of managers would represent a higher degree of control of the CEO. However, in SMEs, managers are not numerous and it is not rare that other family managers with the same vision are involved in management. For these reasons, the following hypothesis is posed:

*H6: The number of managers is negatively related to the likelihood of CEO dismissal.*

Past performance is also likely to have an influence on CEO dismissal. Indeed, the classical theory would say that the absence of value creation for shareholders leads to CEO dismissal. However, in family SMEs, past performance would not have an impact on CEO dismissal as family owners are more concerned with the preservation of their sociaemotional wealth which includes the perpetuation of family leadership through CEO position (Gomez-Mejia et al., 2007). As such, past performance is less likely to exert a significant effect on CEO dismissal. Therefore, we hypothesize:

*H7: Past ROE is not related to CEO dismissal in family SMEs.*

Finally, firm size is also considered in the model and is assessed by the number of employees. While it should have a positive effect on CEO dismissal in case of poor performance for listed firms since they benefit from the market for corporate control, the same is not true in SMEs. Indeed, external control from the market is inexistent for SMEs (Lubatkin et al., 2005). Therefore, larger firms would be a fertile field for managerial entrenchment since CEOs have a greater chance to develop implicit contracts within the organization, such that they can keep their position at the helm of the company. Thus, the following hypothesis is proposed:

*H8: Firm size is negatively related to the likelihood of CEO dismissal.*

## 2. Methodology

### *2.1 Sampling Method*

This research focused on Belgian SMEs (with less than 100 employees) which often present a family nature. To be sure that the family essence was deeply anchored in the company, we collect data for firms created before December 31, 1999. The financial information was collected from the Belfirst database provided by Bureau Van Dijk. The information related to ownership and management structures were derived from a survey launched to 2,000 SMEs.

The survey allows us to gather 391 exploitable answers, which represents a response rate of 19.55%. Besides, we also test the representativeness of our sample based on a three criteria: sector affiliation, geographical localization, and the number of employees. At a 5% threshold, our results indicated that no difference was observed between the respondents and non-respondents.

To determine whether the SME can be defined as a family business, we consider that a firm was a family business if it fulfills the two following criteria:

- A family possess at least 50% of the shares.
- The majority of the top management team is family dominated.

This definition has the advantage of being clear and based on easily measurable criteria. Moreover, this family firm definition is frequently used in the recent literature (Anderson & Reeb, 2003; Colot, 2010; Hirigoyen & Poulain-Rehm, 2014). Based on this definition, 318 SMEs can be considered as family businesses, which represents 81.33% of our sample. This observation is line with prior research led in Belgium (Witterwhulghe et al., 1994; Jorissen et al., 2002).

From our survey, we also identified 159 CEO dismissals, 130 presenting a family character. As some companies did not provide all the information related to CEO dismissal (date and governance variables), we finally obtain a sample of 102 SMEs with a CEO dismissal. These 102 SMEs have been paired with 102 SMEs which did not experience CEO dismissal in the same period. Matched-pair analysis enables to isolate demographic features that often alter the results in comparative studies (Jorissen et al., 2002; Westhead & Cowling, 1998).

To proceed to the pairing, the control sampling was determined as follows:

- Family or nonfamily SME.
- Sector affiliation (based on NACEBEL nomenclature for sector classification in Belgium).
- Firm size: Total asset cannot vary with more or less 20% (Note 1).

To carry out the matched-pair analysis, we took into account the family character of the firm. As such, we paired family SMEs where a CEO dismissal was observed with family SMEs where no CEO dismissal was identified in the same period. We replicated this procedure for nonfamily SMEs.

Table 1. Descriptive statistics

| *Variables* | | *Mean* | *Médian* | *Standard Deviation* | *Max* | *Min* | *%* |
|---|---|---|---|---|---|---|---|
| CEO age | SMEs with CEO dismissal | 59.15 | 61.00 | 9.25 | 79.00 | 28.00 | |
| | SMEs without CEO dismissal | 43.56 | 42.00 | 8.89 | 68.00 | 23.00 | |
| CEO tenure | SMEs with CEO dismissal | 18.20 | 18.00 | 11.09 | 49.00 | 0.00 | |
| | SMEs without CEO dismissal | 12.90 | 12.00 | 7.63 | 36.00 | 0.00 | |
| Firm age | SMEs with CEO dismissal | 30.02 | 21.00 | 29.20 | 127.00 | 1.00 | |
| | SMEs without CEO dismissal | 13.04 | 12.00 | 7.55 | 36.00 | 1.00 | |
| Number of managers | SMEs with CEO dismissal | 1.54 | 1.00 | 0.80 | 5.00 | 1.00 | |
| | SMEs without CEO dismissal | 1.65 | 1.00 | 0.81 | 4.00 | 1.00 | |
| Number of employees | SMEs with CEO dismissal | 7.17 | 5.00 | 6.01 | 39.00 | 2.00 | |
| | SMEs without CEO dismissal | 7.90 | 5.00 | 7.47 | 39.00 | 1.00 | |
| Past ROE (one-period | SMEs with CEO dismissal | 37.06 | 28.85 | 71.62 | 300.00 | -321.70 | |
| Lagged) | SMEs without CEO dismissal | 40.83 | 30.20 | 57.86 | 391.26 | -85.71 | |
| Past ROE (two-period | SMEs with CEO dismissal | 42.80 | 27.03 | 77.73 | 479.14 | -239.20 | |
| Lagged) | SMEs without CEO dismissal | 50.59 | 40.92 | 50.48 | 398.97 | -5.51 | |
| CEO duality | SMEs with CEO dismissal | | | | | | 98.03 |
| | SMEs without CEO dismissal | | | | | | 98.03 |
| Family ownership | SMEs with CEO dismissal | | | | | | 76.47 |
| | SMEs without CEO dismissal | | | | | | 78.43 |

Descriptive statistics are presented in Table 1. It compares SMEs with CEO dismissal and SMEs without CEO dismissal. We observed that SMEs where a CEO was dismissed were considerably older. Also, it seems that older and longer tenured CEOs are more likely to be dismissed. Furthermore, it also appears that SMEs without CEO dismissal present higher past ROE one year and two years before CEO replacement.

### *2.2 Econometric Procedure*

To test the impact of managerial entrenchment on the likelihood for CEO to be dismissed, logistic regressions were used. This procedure supposes that the dependent variable is a dummy variable with the value of 1 if the CEO has been dismissed (102 observations) and 0 otherwise (102 observations). The independent variables are CEO age, CEO tenure (the number of years the CEO is in charge of the firm), Family ownership (the percentage of shares held by the family), Firm age (the number of years since the company creation), CEO duality (a dummy variable equaling 1 if the CEO is also owners, 0 otherwise), the number of managers, Past ROE (calculated as Cash-flow/Equity lagged with one period), Firm size (calculated as the natural logarithm of the number of employees). We checked for multicollinearity to avoid biases in our regressions. After controlling for this issue, we had to separate several independent variables in the models: CEO age, CEO tenure and Firm age. This explain the presence of three different models in the following section.

## 3. Results and Interpretations

Our hypotheses were tested using the SPSS software. It is important to note that this software enables to automatically test for heteroscedasticity concerns. The results are presented in Table, 2, 3 and 4.

Table 2. The CEO age model

| | *Beta* | *Standard Deviation* | *T-stat* | *P-value* |
|---|---|---|---|---|
| Intercept | -0.838 | 0.284 | -2.948 | 0.004 |
| CEO age | 0.028 | 0.003 | 11.025 | 0.000 |
| CEO duality | 0.009 | 0.227 | 0.04 | 0.968 |
| Family ownership | -0.07 | 0.072 | -0.971 | 0.333 |
| Firm size (Ln) | -0.019 | 0.039 | -0.48 | 0.632 |
| Number of managers | -0.024 | 0.039 | -0.624 | 0.533 |
| Past ROE | 0.000 | 0.001 | -0.782 | 0.425 |
| $R^2$ | 0.446 | | | |
| *Adjusted* $R^2$ | 0.424 | | | |
| *F-stat* | 20.622 | | | |
| *Sig.* | 0.000 | | | |

The first model presented in Table 2 shows that CEO age is positively related to the likelihood of CEO dismissal while the other independent variables do not exert a significant influence on the dependent variable. This observation contradicts hypothesis 1 according to which CEO age should reduce the likelihood of CEO dismissal due to his/her higher degree of entrenchment. An explanation for this could be that family owners want to ensure that the firm will be passed onto the next generation. As a consequence, they would prefer to change the CEO when he becomes older as he/she is more likely to rely on path-dependent strategies that increase the risk of failure and bankruptcy of the firm (Lubinsky, 2011).

Table 3. The CEO tenure model

| | *Beta* | *Standard Deviation* | *T-stat* | *P-value* |
|---|---|---|---|---|
| Intercept | .414 | .298 | 1.389 | .167 |
| CEO-duality | -.037 | .252 | -.148 | .882 |
| Family ownership | -.042 | .094 | -.452 | .652 |
| Firm size (Ln) | -.090 | .053 | -1.694 | .093 |
| Number of managers | .012 | .050 | .240 | .811 |
| Past ROE | .000 | .001 | .215 | .830 |
| CEO tenure | .018 | .004 | 4.313 | .000 |
| $R^2$ | 0.123 | | | |
| *Adjusted* $R^2$ | 0.086 | | | |
| *F-stat* | 3.286 | | | |
| *Sig.* | 0.005 | | | |

In the second model reported in Table 3, CEO tenure is positively related to the likelihood of CEO dismissal. This result contradicts hypothesis 2 but is in line with the effect observed for CEO age in Table 2. Again, it seems that family owners prefer to dismiss longer tenured CEO to avoid the risks of entrenchment for the durability of the organization. Indeed, the lack of innovation that often characterized longer tenured CEO (Huybrechts et al., 2013) can jeopardize the future of the company, and thus socioemotional wealth preservation in the long term (Chrisman and Patel, 2012).

Table 4. The firm age model

| | *Beta* | *Standard Deviation* | *T-stat* | *P-value* |
|---|---|---|---|---|
| Intercept | .594 | .282 | 2.107 | .037 |
| CEO duality | -.023 | .244 | -.096 | .924 |
| Family ownership | -.073 | .088 | -.831 | .407 |
| Firm size (Ln) | -.067 | .048 | -1.394 | .165 |
| Number of managers | -.026 | .049 | -.534 | .594 |
| Past ROE | .000 | .001 | .362 | .718 |
| Firm age | .008 | .002 | 5.179 | .000 |
| $R^2$ | 0.156 | | | |
| *Adjusted* $R^2$ | 0.123 | | | |
| *F-stat* | 4.740 | | | |
| *Sig.* | 0.000 | | | |

The results reported in Table 4 reveal that Firm age is positively related to the likelihood of CEO dismissal. Even if this observation contradicts hypothesis 5, it complements our previous findings regarding CEO age and tenure. It therefore seems that CEOs are more likely to be dismissed in older family SMEs. An explanation for this could be that family owners want to refresh the strategy of the organization in order to better fit with the constraints of the changing environment. By involving a new CEO in the decision-making process, family owners would operate in the interest of the company and the family by preserving the future economic and socioemotional wealth (Naldi et al., 2013).

Besides, we also observed that Firm size is negatively related to the likelihood of CEO dismissal. However, this finding is only confirmed in Table 3 at a lower level of significance. For these reasons, we can say that hypothesis is partially supported. It also appears that past performance does not exert any influence on the

likelihood of CEO dismissal. This result is in line with hypothesis 7 and tends to confirm that family owners have a greater inclination to privilege long term return on their investment rather than short-term payout terms (Lumpkin & Brigham, 2011). As a consequence, they do not penalize CEOs for poor levels of shareholders' return. Besides, hypothesis 3, 4 and 6 are not supported. A summary of our findings is presented in Table 5.

Table 5. Summary of the findings

| Hypotheses | | Findings |
|---|---|---|
| H1 | CEO age is negatively related to the likelihood of CEO dismissal. | The opposite is supported |
| H2 | CEO tenure is negatively related to the likelihood of CEO dismissal. | The opposite is supported |
| H3 | Family ownership is negatively related to the likelihood of CEO dismissal. | Not supported |
| H4 | CEO duality is negatively related to the likelihood of CEO dismissal. | Not supported |
| H5 | Firm age is negatively related to the likelihood of CEO dismissal. | The opposite is supported |
| H6 | The number of managers is negatively related to the likelihood of CEO dismissal. | Not supported |
| H7 | Past ROE is not related to CEO dismissal in family SMEs. | Supported |
| H8 | Firm size is negatively related to the likelihood of CEO dismissal. | Partially supported |

## 4. Conclusion

An important issue in the family business field is the consequences of managerial entrenchment. Prior research has mainly focused on performance outcomes in listed family firms to assess the implication of managerial entrenchment (e.g. Castenias & Helfat, 1991; Charreaux, 1997; Anderson & Reeb, 2003; Isako & Weisskopf, 2009; Bauweraerts & Colot, 2014). In this study, we focused on another aspect that has been overlooked in the literature: the impact of managerial entrenchment on CEO dismissal in family SMEs.

Our results indicate that the risk of entrenchment can have a positive impact on the likelihood of CEO dismissal. Indeed, CEO age and tenure as well as Firm age have been shown to enhance CEO dismissal. These results seem to suggest that family SMEs with higher levels of specific risk of managerial entrenchment (older and longer tenured CEO, older firm) are more likely to dismiss their CEOs. Therefore, it appears that family owners are conscious of the risks that managerial entrenchment can induce for the future of the company and the family wealth, which pushes them to react and to hire new executives.

Besides, this study offers two main contributions to the family business literature. First, we investigate an organizational context in which managerial entrenchment has been underexplored (Carney et al., 2015). Furthermore, by providing results that are contradictory to the main stream of research, we add to the debate on how the risk of managerial entrenchment affects CEO turnover in family SMEs.

However, this research also suffers from several limitations that must be acknowledged. First, we did not take into account the generational status of dismissed CEO as we did not possess the information about this attribute. As it was shown that adopting a generational perspective is important to increase our current understanding of managerial phenomenon in family SMEs (Cruz & Nordqvist, 2012), future research should integrate this variable to find potential intergenerational differences. Also, our study focused on a specific institutional setting of continental Europe. Accordingly, it would be interesting to replicate our study in other national setting to determine whether our results are generalizable to other national, cultural and institutional contexts (Minkov & Hofstede, 2011). Finally, we considered the individual effect of different variables to estimate the risk of managerial entrenchment. Therefore, future studies could use a scale to assess the global risk of managerial entrenchment in order to determine if a unidimensional approach of managerial entrenchment would be more appropriate.

Finally, by investigating the determinants of CEO dismissal in the context of family SMEs, we offer novel perspectives that, we hope, will foster the emergence of future research in the field.

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## Note

Note 1. When several firms corresponded to these criteria, the closest in terms of total asset was selected for the pairing.

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# Dividend Distribution, Ownership Structure and Performance of Unlisted Companies Cameroonian

T. Maï Django Wambé[1] & Sadjo Kaoutoing[1]

[1] Department of Accounting and Finance, Ngaoundéré University, Ngaoundéré, Cameroon

Correspondence: T. Maï Django Wambé, Department of Accounting and Finance, Ngaoundéré University, P. O. Box 454, Cameroon. E-mail: wtmaithe@gmail.com

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**Abstract**

This research goes within the framework of previous studies examining the specificity of the ownership structure and financial performance of unlisted companies in a dividend distribution environment. The assumptions are based on the agency theory in which shareholders justify the implementation of dividend distribution and explain the financial performance of companies. Our sample consists of 67shareholding companies (Limited Companies and Limited Liability Companies) which best explain dividend distribution in the Cameroonian context. Data were processed using SPSS (Statistical Package for the Social Sciences). We note that the concentration of ownership has no effect on financial performance. However, the nature of the major shareholder plays a decisive role on financial performance.

**Keywords:** dividend distribution, financial performance, nature of ownership, shareholding concentration, unlisted companies

## 1. Introduction

In the context of a growing financial market, this research aims to study empirically, the relationship between the ownership structure and the financial performance of companies. In countries where most companies are listed, the theoretical and empirical analyses of this relationship, so far, has led to different conclusions. This is certainly due to the diversity of ownership characteristics and contexts studied. In this study, we plan to take into account, not only the two characteristics of the shareholding (capital concentration and nature of the major shareholder), but also the dividend distribution behaviour in Cameroonian companies (Note 1). Given that the Cameroonian context has not been studied much, deepening it seems interesting because of the peculiarity of Cameroon's unlisted companies' ownership structure: High concentration, strong presence of families and institutional investors (Wanda, 2001).

As part of the dividend policy, the ownership structure is also an important element. Indeed, dividend is seen as a means of resolving conflicts of interests between managers and shareholders. Also, putting forward dividend distribution to study the relationship between ownership structure and financial performance seems very interesting in the Cameroonian context. In addition, the approach of the relationship between financial performance and shareholding structure of companies distributing or not distributing the dividend enables a positioning within the theoretical framework of the agency. In fact, research on dividend distribution in family companies show that these ones generally distribute less than the non-family ones. Some studies show that they are more efficient. However, From the innovating articles of Burkart et t al. (2003), performance studies compare between several forms of family businesses based on possible combinations of control and management, depending on whether they are family or not.

Thus, this new conception on the separation between ownership and management functions, leads us to position ourselves not only at the angle of the concentration and nature of ownership (shareholding), but also in the context of the agency theory in order to better understand the financial performance of companies in the Cameroonian context. The agency theory suggests indeed that separation of ownership and control is at the basis of agency conflicts within firms. Managers could act oppositely to the interests of shareholders throughout their decision-making process (Jensen & Meckling, 1976). According to this theory, the interests of the executives could be aligned to those of shareholders through a form of remuneration such as dividends which binds the executives' wealth to the performance of the firm. Also, (Berle & Means, 1932) mention the fact that separation

between ownership and management functions explores different research paths and suggests that a conflict of objectives between owners and managers of a company should appear to influence the performance of the firm. For (Demsetz & Lehn, 1985) the presence of a controlling shareholder acts as a governance mechanism to discipline the leaders. The concentration of capital thus contributes to align the interests of the controlling shareholders on those of the minority. The nature of shareholders may also influence the resolution of agency conflicts. The agency theory therefore considers that organisational costs are very low in family businesses because property rights are limited to decision-making agents and to agents who personally bear the consequences (Jensen & Meckling, 1976; Fama & Jensen, 1983). This would make management easier and allow a good performance.

Shareholders' position towards dividend policy therefore seems important to us in the assessment of the performance of companies, in a context where there is no financial market. Most studies have focused on the relationship between ownership structure and performance, highlighting the nature of shareholders (family shareholding). Research conducted in Cameroon were based on the explanatory factors of dividend (Mai & Tsapi, 2013), financial structure and performance (Wanda, 2001), corporate governance and performance (Feudjo, 2006). By examining the relationship between ownership structure and performance of companies that distribute or do not distribute the dividend, we integrate to the study, the nature and concentration of ownership. This research is, thus, the first research in this context but comes to complement existing studies in the world.

**The subject of our research is to deepen the relationship between ownership structure and corporate performance in an environment characterised by the distribution of dividend**. The central question guiding our thinking is this: **does the financial performance of Cameroonian companies differ from their ownership structures, taking into account the distribution of dividend?** On the basis of this question, we have two main objectives: to highlight the specificities of the policy of dividend distribution in these types of companies and to compare the financial performance of companies according to their ownership structure and on the decision to distribute dividend.

This article is organized as follows: the first part is initially devoted to the presentation of the relationship between dividend policy and ownership structure and, secondly, to present the theoretical performance of different types of ownership and research hypotheses. In the second part, we present the methodology, the empirical results and the interpretation of results. Finally, we present our conclusions.

## 2. Dividend Distribution and Ownership Structure

According to Severin and Dhennin (2003), the ownership (shareholding) structure is a plural concept because it includes the shareholding structure (concentration and/or nature of the shareholders) and the executives' contributions to the capital. Despite divergent results from empirical studies across countries, this variable helps to explain some of the variations in the distribution policy.

### *2.1 The Nature of Ownership and Dividend Distribution*

The nature of ownership falls within the theoretical framework of the agency, its influence on dividend policy is based on the works of Jensen and Meckling (1976). Indeed, firms controlled by a family, a group of people or an institution, do not have the same distribution potentials (Charreaux, 1991; Allouche & Amann, 1995; Romieu & Sassenou, 1996). Also, family businesses constitute the most prevalent form of business organisations in developed countries (Du., 2007) as well as in developing countries (Khanna, 2000). For Latrous Imen (2004), family businesses are often organised in a pyramidal form so that a shareholder can hold the majority of shares or voting rights. We see then that this type of business is much more concentrated than dispersed. This is shown in the study by Faccio and Lang (2002). Of the 607 companies in their sample, 64.82% are controlled by families and only 14% has a dispersed ownership. We therefore believe that family businesses have a concentrated ownership, and to this end, distribute dividend less.

By focusing on Japanese firms, Stouraitis et al. (2004) found, in the case of low-growth companies, that institutional ownership has a positive effect on dividends. In Austria, Yurtoglu and Gugler (2003) found that the identity of the controlling shareholder only influences the distribution rate of companies which have many investment opportunities. They show that firms controlled by the state have a higher distribution rate than firms controlled by another company or a bank. On the other hand, companies controlled by families have the lowest distribution rate. It is in this sense that the director of a company offering services specified: " *I, as a family head and director of the company, occasionally deduct on the profits to solve the problems of my wife and my children who are shareholders*" (Note 2).

In the same vein, Calvi-Reveyron (1999, 2000) shows that family firms distribute dividends less than managerial

firms and companies controlled by other types of shareholders. Thus, the special agency model of family firms adversely affects agency costs and thereby, can reduce the need to pay significant dividends to shareholders. In line with this reasoning, Poulain-Rehm (2000) notes that the family ownership structure implies a reduction in the distribution rate compared to other types of structures.

*2.2 Ownership Concentration and Dividend Distribution*

The ability to extract profit or the difficulty to be controlled may vary from one ownership structure to another. The influence of ownership concentration on dividend policy has been the subject of much literature.

Thus, in France, in two studies carried out in 131 French companies for the period 1988-1994, Calvi Reveyron (2000) also found that dividends are higher in managerial firms' than in family businesses. Indeed, the presence of dominant or significant shareholders in a company is part of the control exercised over the executive. Therefore, dominant shareholders are likely to promote or oppose the distribution of dividend. Based on this logic, we can say that it is those who have power that decide. Thus, the holding of shares or voting rights by certain shareholders may aggravate the non-distribution of dividend. It is in this sense that studies by Rozeff (1982), Lloyd et al. (1985), Dempsey and Laber (1992) show the negative influence of ownership concentration on dividend distribution. By focusing on Finnish companies, Maury and Pajuste (2002) show that the negative influence on the dividend distribution rate lies at the major shareholder's control. Their results are in line with the control of decisions by the dominant shareholder but may also be the evidence of an expropriation of minority shareholders by a control shareholding. According to these authors, the presence of a shareholder with more than half of the firm's control has a negative effect on the distribution rate.

But on the other hand, the negative relationship between the distribution policy and ownership concentration is not backed by other researchers. The works of Renneboog and Trojanowski (2007) show a positive relationship instead. Their empirical study, which focuses on a sample of 985 British companies, tends to show a positive relationship between ownership concentration and dividend policy. In fact, they noticed that the presence of control blocks in the shareholding aims to reduce agency costs and improve the sharing of dividend. The study by Kouki and Guizani (2009) in Tunisian enterprises also backs the idea that a high concentration of ownership encourages high dividend distribution.

From this literature review, we note that the presence of majority shareholders in the ownership structure positively or negatively influences the distribution policy. Because of this discrepancy in the literature on the subject, an exploratory study was conducted in eight Cameroonian companies to determine the factors explaining the distribution of dividend. The role of the shareholding structure was raised by several respondents. Thus, several times, five CEOs took their companies as examples. They mentioned the presence of one or two majority shareholders in the capital structure and their reluctance to admit dividend distribution. To illustrate this situation, we retained the response of the manager of a business enterprise in the city of Garoua, "*I am the majority shareholder of the company... the more we distribute dividend, the more there is capital flight*". In such a context it is important to consider the relationship between ownership structure and performance.

**3. The Performance of Companies through the Opening of Capital**

In this part, we present the relationship between the ownership structure and the company's performance proposed by the agency theory, and we formulate related research assumptions.

*3.1 Nature of Ownership and Corporate Performance*

After showing the relationship between nature of ownership and dividend distribution, the analysis of performance is also greatly enriched when combined to the nature of ownership. In fact, most empirical studies on ownership structure have demonstrated the superiority of the performance of family businesses over other types of ownerships (Note 3).

Also in managerial companies, the works of Craswell et al. (1997) show a nonlinear relationship between the executives' shareholding and the company's performance. For them, the association would be positive firstly, and then the link between the executives' shareholding and performance would be negative from a certain level of ownership by the executives. Similarly, other authors (Alonso-Bonis & Andrea-Alonso, 2007) mention a positive relationship between the managers' shareholding and performance. On the other hand, the relationship between institutional investors, state ownership and performance is also mitigated. In fact, Al Farooque et al. (2007) notice a nonlinear relationship between the level of investors' shareholding and the performance of companies, which suggests that institutional investors invest in the control of a firm only as from a certain level of shareholding. One may think that the influence of the nature of ownership depends on the degree of involvement of controlling shareholders within the company. In particular, family shareholders who are

executives are supposed to have a long term interest in the company.

Thus, Palmer (1973) noticed that companies with high family ownership also have significantly higher rates of profit. In the same vein, Sorensen (1974) conducted a study on 60 companies, amongst which are 30 family companies (20% or more of the shares are held by the family) and 30 managerial companies (no block of more than 5%) during the period 1948-1966. He concluded that family businesses grow faster than other types of businesses. Other studies by Sraer and Thesmar (2007), Allouche and Amann (1998), Gallo and Vilaseca (1996), Romieu and Sassenou (1996), Djelassi (1996) show a positive influence of family ownership on the performance of companies.

But on the other hand, the positive relationship that exists between company performance and family ownership is not supported by other researchers. Also, some studies show that family members are sometimes motivated by their own interests and not by family interests (Morcket et al., 1988; Morck & Yeung, 2003). Phenomena of nepotism and opportunism are likely to arise in the chief executive officer and generate a behaviour of maximisation of his personal utility to the detriment of minority shareholders (Markin, 2004). Anderson and Reeb (2003) as well as Maury (2006) even demonstrate on an empirical basis (American for Anderson and Reeb and European for Maury) that a family ownership structure initially improves the value of the company, but also that this value decreases as from a certain level of family ownership (approximately 30%).

Despite the contradictory debates that we have just mentioned, both the conceptual arguments and the empirical validation provided by literature about the performance and nature of ownership largely seem to support the hypothesis of the superiority of family businesses over other organisations. Also, faced with this situation and in our context where most of the businesses are family, we suggest the following hypothesis:

**H1: family ownership positively influences the performance of Cameroonian companies in a dividend distribution environment.**

*3.2 The Concentration of Ownership and Corporate Performance*

The study of ownership concentration in the literature shows that it is a determining factor for the performance of companies. The relationship between these two variables can either be positive or negative. Also, from a theoretical point of view, ownership concentration may be positively associated to performance if it is assumed that concentration causes a convergence of executives' and remaining shareholders' interests (Jensen & Meckling, 1976). Several empirical studies have tested the relationship between the concentration and performance of companies but the results obtained are divergent across countries.

In Spain, Alonso-Bonis and Andrés Alonso (2007) found a positive relationship between ownership concentration and performance, especially when the control has the majority. In France, Boubakri et al. (2005) observed a positive relationship on an international sample and noticed that the positive effect is more pronounced when the protection of minority shareholders is lower. In the United States Morck et al. (1988) presented studies which indicated that this effect had the image of a bell-shaped curve (curvilinear relationship): As concentration increases and performance improves, then reaches a maximum point on the curve, then a negative slope, and thus a negative effect on the degree of concentration. When a shareholder has too much control, it may draw some of the profits for himself rather than for the company.

In another sense the concentration of ownership may also have a negative effect. In fact, when ownership is concentrated in the hands of the executives, it sometimes becomes difficult to evict them even if their performance is unsatisfactory. The works of Shabou (2003) examine the impact of capital's concentration on financial performance in the Tunisian context. They conclude that the concentration of capital has an insignificant impact on performance. More recently, Kirchmaier and Grant (2005) showed a negative relationship between ownership concentration and performance in the European context. They noted that the phenomenon is especially true when the majority shareholder holds more than 10% of capital.

We find out that the concentration of ownership helps to explain some of the variations noticed in the performance of companies but empirical studies' results are divergent. Thus, in the Cameroonian context characterised by a weak protection of minority shareholders and a concentrated ownership, we assume that the low level of minority shareholders' protection is likely to reinforce the positive link between concentration and financial performance. This leads us to formulate the following hypothesis:

**H2: the financial performance of Cameroonian companies is positively associated to ownership concentration in a dividend distribution environment.**

## 4. Empirical Study

In this second part, we will first present our sample, measures of the variables, as well as the descriptive analysis. After that, we will present the empirical results and their interpretation.

### *4.1 Sample*

To carry out this research, we opted for the hypothetical-deductive method. We also used qualitative and quantitative analysis and showed how the combination of these methods enriches the analysis of dividend policy and performance. The use of combined techniques often leads to more relevant and richer data. The qualitative study conducted among the executives who decide on the distribution of dividend in companies highlights the behaviour of Cameroonian companies and local specificities in the use of profits. It describes the distribution's decision-making process. The quantitative study is then implemented to test the hypotheses of our theoretical model. The study population includes Limited Liability companies and Limited Companies only.

In the absence of an exhaustive list of the study population, the compilation of data from various sources (Cameroon Zoom and advertising media) led to the constitution of a directory of 245 companies. This sampling base is due to the administration of our questionnaire in the cities of Douala and Yaoundé (these two regions account for 97% of the industrial, commercial and service companies of our survey). In addition, of the 245 companies comprising our sampling base, we were able to establish contact with only 75 of them. We had 67 usable responses. The figure below shows the distribution of the different categories of companies belonging to the study sample according to the legal form.

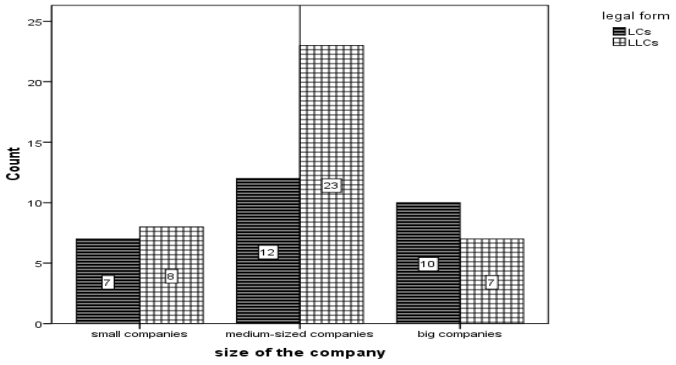


Figure 1. Distribution of companies according to their size and legal form

It seems quite clear that the Limited Companies (LCs) and the Limited Liability Companies (LLCs) are part of the small, medium-sized and big companies. A high concentration of medium-sized companiesis observed among the LLCs (23 companies) and the LCs (12 companies). However, we also note that most of the big companies are LCs (10 companies) compared to small ones (7 companies).

### *4.2 Variables*

#### 4.2.1 The Explained Variable: Financial Performance

Thomsen and Pedersen (2000) used two variables to measure the financial performance of a company: An accounting variable (return on assets (ROA)) and a variable of market valorisation (Tobin's Q). As highlighted by Demsetz and Villalonga (2001), the two variables do not measure the same aspects of financial performance with respect to two criteria: the temporal aspect and the measure's shaping. From a temporal perspective, the ROA measures a past accounting performance while Tobin's Q is guided by investors' expectations. On the other hand, if the ROA is the result of professional constraints to income statements, Tobin's Q integrates the psychology of investors in the valuation of companies' equity. Gomez (1996) considers net income as a final measure of profit and therefore as a prime indicator of financial performance. In this work, we have used this measure. The following table highlights performance in the companies of our sample.

Table 1. Distribution of companies according to increase in net income

| **Bottom line (net income)** | Quantity | Percentage | Cumulated Percentage |
|---|---|---|---|
| Insufficient | 15 | 22,4% | 22,4% |
| Stable | 11 | 16,4% | 38,8% |
| Satisfactory | 41 | 61,2% | 100,0% |
| Total | 67 | 100,0% | |

Source: Our surveys.

On the whole of our sample, 41 companies (61.2%) are satisfied with the increase in net income. We notice that companies which think net income is stable are very far from those for which net income progresses (11 companies or 16.4%). However, 15 companies (22.4%) have a stable net income.

4.2.2 Explanatory Variable

* CONCENTRATION OF CAPITAL

The number of shareholders in the company: This measure is frequently used in North American research by authors such as Rozeff (1982) and Noronha et al. (1996), to assess the dispersion of ownership. On the other hand in Cameroon, there is no precise measure of this variable and we are not using this variable in the framework of our research.

The Herfindahl index: This is an index of concentration, often used in economics. It is possible to calculate the concentration of ownership or control using this index. Some authors use the percentage of the ownership or of the control of the top three shareholders. For Montandrau (2004) for example, it is possible to estimate the concentration of ownership using this measure. One can use either the percentage of shares or the control of voting rights. In our qualitative study, we noticed that it was very easy for the executive to estimate at least the percentage of shares of the top three shareholders. This is why we choose to retain this measure. There are several levels which make it possible to consider that a shareholder is the majority one. We chose the 33.33% threshold recommended by Calvi-Reveyron (2000), which corresponds to the necessary blocking minority in a general assembly meeting.

* MEASURING THE NATURE OF OWNERSHIP

We made the assumption that the nature of ownership had an influence on the performance of Cameroonian companies. The identity of the major shareholder can help to understand the nature of variations in the financial performance of companies. As we said in the first part, literature is not unanimous on what "Influence of the presence of a major shareholder" means, be it a family, a bank, a company, an institution, the State, a group of individuals, etc. Results vary across countries. We therefore measure the nature of ownership by four sets of variables as shown in the table below.

Table 2. The nature of ownership

| Measuring the nature of ownership | The State and other public organisations | Industry | A family | Managerial (individuals)) |
|---|---|---|---|---|
| Nature of the major shareholder | ☐ | ☐ | ☐ | ☐ |

Added to these measures are: The distribution of dividend, investment opportunities, the size and the activity sector.

* DIVIDEND DISTRIBUTION

* The distribution policy is usually measured by two variables:

**The rate of distribution**, which is the dividend pay-out ratio with respect to the company's revenues (Rozeff, 1982; Noronha et al., 1996; ....). This rate reflects the arbitration made by managers between distribution and retention, despite the fact that its interpretation is unlikely for companies that pay out the dividend, irrespective of whether a low income or a loss (Wood, 2007). This can be used in the Cameroonian context with its financial market that is still to take off.

**The dividend yield**, which is the ratio of the dividend on share price or the pay-out on market capitalization of the company (Hu & Kumar, 2004). The yield reflects the point of view of shareholders and their return on

investment. However, its assessment can vary greatly depending on the chosen share price (mid-year, year-end ...). The difficulty in interpreting dividend yield in our context where the financial market is almost non-existent is a major limitation to these measures in our work.

Given that pay-out rates are not made known to the public in Cameroonian companies, we choose to measure distribution policy by the dividend pay-out frequency. We believe that measuring dividend distribution by the pay-out frequency (arbitration between distribution and retention) is more suited in the Cameroonian context, since it is easier to deal with this one in an environment where most companies are not listed. Exploratory investigation to confirm the effectiveness of certain practices concerning dividend distribution in Cameroonian companies, led to the identification of this attribute. Thus, the frequency of distribution differs across companies. For example, in a company it will be shown that the payment of dividend can be every year (always). In other companies, it will be all about showing that the payment of dividend goes beyond a year (often) and as the years go by, payment becomes scarce. In some other companies still, there are no dividend pay-outs (never). We hold as measure, the dividend distribution frequency.

* INVESTMENT OPPROTUNITES

The intensity of research and development in a company can help assess its investment opportunities if we assume that research creates growth opportunities. This measure is used by Poulain-Rehm (2005). Some writers like Denis et al. (1994), Grullon and Michaely (2004) appreciate the level of investment opportunities in a firm through capital expenditures, acquisition of equipment and through future research and development. Thus, investment opportunities of the year N can be evaluated by the amount of investments made in N + 1. It is in this sense that we measure investment opportunities through expenses on research and development, in the acquisition of equipment and in the training of employees. All these expenses are assessed with respect to the company's income.

* THE SECTOR

In our survey, we distinguished 18 industrial companies, 26 service companies and 23 trade companies.

* MEASURING COMPANY SIZE

About the size, we opted for the classification of companies in line with that of Cameroon's Economic and Social Council, that is, small companies (10 to 49 employees); Medium-sized companies (50-150 employees); Big companies (151 or more). Therefore, a synthesis of the variables retained is as follows:

Table 3. Summary of definitions and variables retained in the model

| Variables | Definitions | Measures |
|---|---|---|
| PERFI | Financial Performance | Net income |
| CONACT | The concentration of ownership | The percentage of shares held by the top three shareholders |
| NAACT | Nature of the principal shareholder | The State / other public agencies, industry, family, Managerial (individuals). |
| DED | The dividend distribution | The dividend distribution frequency |
| OPPIVEST | Investment Opportunity | Expenses on research and development expenses for the acquisition of equipment and expenses on employee training based on results. |

We conducted a descriptive analysis of these variables. Thus, the descriptive analysis on the variable "concentration of ownership" shows that of the 67 companies in our sample, 36 companies have a percentage of shares held by the top three shareholders greater than 33.33%. This result indicates that companies' ownership is slightly concentrated in the hands of the top three shareholders (53.7% of companies) as shown in Table 4.

Table 4. Percentage of shares held by the first 3 major shareholders

| Percentage of shares of the first three shareholders | Frequency | Percent | Valid Percent | Cumulated Percent |
|---|---|---|---|---|
| Less than 33, 33% | 31 | 46,3 | 46,3 | 46,3 |
| More than 33, 33% | 36 | 53,7 | 53,7 | 100,0 |
| Total | 67 | 100,0 | 100,0 | |

Source: Our surveys.

We see in the table that follows that consideration of the nature of the main shareholder is quite varied. The grouping of individuals has a special place in the companies of our sample. Indeed, shareholders are mostly groups of anonymous investors (38.8%). Industries and families represent 25.4% each. The state and other public agencies represent 10.4% of companies.

Table 5. Identity of the major shareholder

| Nature of the main shareholder | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| The State and other public companies | 7 | 10,4 | 10,4 | 10,4 |
| Industry | 17 | 25,4 | 25,4 | 35,8 |
| A family | 17 | 25,4 | 25,4 | 61,2 |
| Managerial | 26 | 38,8 | 38,8 | 100,0 |
| Total | 67 | 100,0 | 100,0 | |

Source: Our surveys.

Then, on the whole sample, 28 companies (41.8%) always pay out the dividend. We also notice that the number of companies which do not regularly pay out the dividend is not far from those paying the dividend yearly (25 companies or 37.3%). In contrast, 14 companies (20.9%) never pay out the dividend.

Table 6. The distribution frequency

| The dividend distribution | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Never | 14 | 20,9 | 20,9 | 20,9 |
| Hardly | 25 | 37,3 | 37,3 | 58,2 |
| Always | 28 | 41,8 | 41,8 | 100,0 |
| Total | 67 | 100,0 | 100,0 | |

Source: Our surveys.

## 5. Results

### *5.1 The Ownership Structure and Dividend Policy*

Our first objective was to present the peculiarities of dividend distribution with respect to the shareholding structure in the companies of our sample.

**Ownership concentration and dividend policy**

In the case of this first relationship, the Levene test indicates that the variances of ownership concentration are unequal, from the dividend distribution perspective ($F = 6.008$; $p = 0.017$). With the assumption of unequal variances, the absolute value of the obtained Student's t is 5.016 to 66 degrees of freedom and significant at $p = 0.000$. This result indicates the presence of an ownership concentration effect on dividend distribution. This result reinforces the finding according to which companies that have a percentage of shares held by the top three shareholders greater than 33.33%, do not distribute dividends. We can therefore say that the decision to pay out the dividend varies negatively with respect to the concentration of ownership in the companies in our sample.

**The nature of ownership and dividend policy**

As a reminder, the identity of the major shareholder being understood thanks to four answer modalities, we will use an analysis of variance to 1 factor (ANOVA one way). In this case, the statistical Levene is 3.413 at significance level of $p = 0.023$. This reflects the lack of homogeneity of variances between the four groups of shareholders considered, in relation to the identity of the shareholders. Analysis of variance revealed a Fisher's F of 6.193, significant at $p = 0.001$. This Fisher's F probability being well below the significance level of 0.05; there are significant differences with respect to the identity of the major shareholder when considering the variation of dividend distribution in the medium-sized companies. In other words, the payment or non-payment of dividends in companies would differ, depending on the nature of the major shareholder in these enterprises.

Scheffe and Ducan's tests at the threshold level of $p = 0.05$ indicate that the average in the group of family companies (-0.873) is lower and significantly different from that of the group of industries (0.765), of the State and other public companies (0,840) and of individuals or managerial companies (0.873). The grouping of

managerial companies, of industrial and State companies, therefore, present high aptitudes in the distribution of dividend compared to companies with family ownership.

*5.2 Model Specification*

The second objective of our work is to check if there is a significant relationship between the financial performance of Cameroonian companies and two variables related to the ownership structure, i.e. the concentration and nature of ownership (shareholding).

5.2.1 The Relationship between the Nature of the Shareholder and the Financial Performance of Cameroonian Companies

In our model, we put forth the first hypothesis (H1): **The nature of ownership positively influences the financial performance of Cameroonian companies in a dividend distribution environment**. Here, it is all about questioning oneself on the changes in performance due to changes in the nature of the major shareholder of the company during a given period. We used analysis of variance to 1 factor (ANOVA one way). The following table shows the results obtained at the end of this analysis.

Table 7. Analysis of variance with one factor between the variation in financial performance and the identity of the major shareholder

| **Test of the homogeneity of variances** | | | | **ANOVA** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | ROA | Sum of squares | Dof | Mean of Squares | F | Sign. |
| Levene'sStatistic (F) | dof1 | dof2 | Sign. | Inter-groups | 8,707 | 3 | 2,902 | 4,915 | 0, 004 |
| | | | | Intra-groups | 37,203 | 63 | 0, 591 | | |
| 6,105 | 3 | 63 | 0, 001 | | | | | | |
| | | | | Total | 39,075 | 66 | | | |

Source: Our survey.

In this case, the Levene statistic is 6.105 at the significance level of p = 0.001. This result reflects the lack of homogeneity of variances between the four groups of shareholders considered, with respect to the identity of the shareholders. Analysis of variance revealed a Fisher's F of 4.915, significant at p = 0.004. This probability of Fisher's F being well below the level of significance of 0.05, there are significant differences in terms of the variation in financial performance between the medium-sized companies with respect to the nature or identity of the main shareholder. In other words, the performance or lack of performance in companies would differ depending on the identity of the major shareholder in the said companies.

Scheffe and Ducan's tests at the threshold level of p = 0.05 indicate that the mean in the group of the state-owned and other public companies (-1.034) is lower and significantly different from that of the group of industries (0.882) and family businesses (1,034). In the companies of our sample, managerial ownership has no impact on financial performance. The grouping of family businesses, of industries, therefore, present strong abilities to perform, compared to companies with state ownership. Also, we notice that family businesses are more efficient than other types of businesses in a dividend distribution environment.

In light of this result, we can say that H1 is confirmed.

5.2.2 Study of the Relationship between Financial Performance of the Company and Shareholding Concentration

In our model, we put forth the second hypothesis (H2): "**The performance of Cameroonian companies is positively associated to the concentration of shareholding in a dividend distribution environment**". A mean comparison test was carried out on variables apprehending the concentration of shareholding and the performance of companies. The results are interpreted in the light of Student's t for a chosen significance level. The following table shows the results obtained.

Table 8. Mean comparison test between the financial performance of companies and the concentration of shareholding

| Mean comparison test | | Levene's test on the inequality of variances | | T-testfor the equality of means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | dof | Sig. (bilateral) | Mean difference | Standard deviation difference | Confidence gap, 95% of the difference | |
| | | | | | | | | | Inferior | Superior |
| **Return on Assets (ROA)** | **Equal variances Hypothesis** | **3,499** | **0,066** | **-2,785** | **65** | **0,007** | **-0,542** | **1,95** | **-0,931** | **-0,153** |
| | **Uneqqual variances Hypothesis** | | | -2,747 | 58,552 | 0,008 | -0,542 | 0,197 | -0,937 | -0,147 |

Source: Our surveys.

Reading the table above, we notice that the Levene test indicates that the variances are equal from a concentrated shareholding to a dispersed one, from the net income's perspective (F = 3.499 at p = 0.066). In the case of an assumption of equal variances, the value of the Student's t is 2.785 at 65 degrees of freedom and significant at p = 0.007. This result reflects the absence of a significant effect of shareholding concentration on financial performance. This result reinforces the finding that performance is crucial for all businesses, regardless of shareholding concentration.

In light of this result, we deduce that **our hypothesis H2 is not validated**.

## 6. Interpretation of Results

A descriptive analysis of companies on the basis of performance reveals differences. We noticed that financial performance is unanimously recognized as a priority decision for companies. With the exception of 15 companies (representing 22.4%) which have an unsatisfactory performance, the majority of companies in our sample either have a stable or a satisfactory performance. With respect to our first objective, analysis of companies according to dividend distribution reveals differences. We also note that the distribution of dividend is unanimously recognized as a priority decision for companies. With the exception of 14 companies (representing 20.9%) which never pay out the dividend, most of the companies in our sample always or sometimes pay out the dividend, despite the embryonic state of the financial market. On the other hand, exceptional dividend payments are not yet part of the customs of Cameroonian companies. Therefore, companies prefer giving cash directly (distribution of cash dividend) to shareholders. But the main objective of this study was to compare the financial performance of companies with respect to their ownership (shareholding) structure. The nature and concentration of shareholding have been identified and we have tested their explanatory power.

Indeed, the existence of a concentrated ownership structure reduces conflicts of interest between the different stakeholders and therefore reduces agency costs inherent to these conflicts. Thus, our statistical test reveals a Student's t of 2.785 at 65 degrees of freedom and significant at p = 0.007. This value does not reflect the presence of a significant effect of shareholding concentration on financial performance.

In addition it reinforces the finding that the positive relationship between shareholding concentration and performance is observed when the concentration is high. Also, in a context where most companies pay out the dividend and that the shareholding is slightly concentrated in the hands of the top three shareholders, we indeed see no effect. This is in contradiction with the formulated hypothesis. This result is consistent with those found in the works of Demsetz and Villalonga (2001) in the United States and Sahut and Gharbi (2010) in France which tend to suggest that there is no link between the concentration of capital and the performance of companies.

Our study on Cameroonian companies confirms the positive influence of the nature of ownership (family shareholding) on financial performance, as highlighted by the majority of studies. Indeed, our results are similar to those revealed by Margaritis and Psillaki (2010). According to Allouche and Amann (1998), trust would be a key factor in explaining the performance of family firms. This trust would be found between managers and employees within the family business, as well as between the family business and its stakeholders. In addition, we notice that companies seek to reduce the level of dividend in order to avoid resorting to external funding and the transaction costs associated to it. To this end, the prudence of company executives leads them to prefer

self-funding.

## 7. Conclusion

The main objective of our research was to study the link between financial performance and ownership structure in unlisted Cameroonian companies. This study seemed interesting to us for many reasons. Firstly, literature analysis suggests a complex relationship which depends on the context of the study. However, the Cameroonian context, characterized by a high concentration of shareholding and a strong presence of the family shareholders, has not been explored much. Finally, our research focuses on both the concentration and nature of the shareholding, and considers different categories of shareholders: family, industrial, managerial and state.

Using a sample of 67 unlisted companies, this study analysed the relationship between ownership structure and financial performance in a dividend distribution context. Indeed, through our first research question, we wanted to highlight the specificities of the payment or non-payment of dividends in Cameroonian companies. Descriptive analysis was carried out to show the specificities of distribution in Cameroonian companies. Thus, results related to the distribution frequency indicate that some companies always pay out (every year) or sometimes pay out (after a certain number of years) the dividend. Others on the other hand never pay cash to investors (41.8% companies always pay out the dividend, 37.3% of companies sometimes pay out and 20.9% of businesses never pay out the dividend). In addition, we found out, on one hand, that there was a negative relationship between dividend policy and shareholding concentration and, on another hand that, family businesses do not pay out the dividend.

This study also reveals that the concentration of ownership (shareholding) has no effect on financial performance. It clearly shows that family ownership is a factor, positively related to the financial performance of companies. The results of the study are similar to those of other studies conducted in developed countries where most of the companies are listed. It will be important therefore, for Cameroonian managers to be attentive to their shareholders. That means satisfying not only their desires in terms of the distribution of profits (so as to ensure the reduction of conflicts of interest between major and minor shareholders and executives) but also their desire to perform.

This work presents some limitations. We have not considered all the factors related to governance such as debt, the legislation, the role of the board, etc. It would be interesting to consider these variables in future research.

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**Notes**

Note 1. In Cameroon, only four companies are listed at the Douala Stock Exchange.

Note 2. An exploratory study was carried out in eight Cameroonian companies.

Note 3. Many other types of ownerships exist in the literature: managerial and salary-based, financial, State-owned, self-owned and industrial.

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# A Research on the Relationship between Top Managers' Intelligence and Their Ideas about Business Process Reengineering: Consideration of Emotionality and Spirituality

Evren Ayrancı[1] & Ayşegül Ertuğrul Ayrancı[2]

[1] Faculty of Economics and Administrative Sciences, Istanbul AREL University, Istanbul, Turkey

[2] School of Applied Sciences, Istanbul AREL University, Istanbul, Turkey

Correspondence: Evren Ayrancı, Istanbul AREL University, Turkoba Mah. Erguvan Sok. No: 26/K 34537 Tepekent-Buyukcekmece, Istanbul, Turkey. Tel: 90-532-405-4094. E-mail: evrenayranci@gmail.com

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**Abstract**

With its dramatic boosts to effectiveness and efficiency, Business Process Reengineering (BPR) is a crucial tool for business success, thus countless businesses in various industries are inspired to get its benefits. Though these benefits are heavily related to technical matters such as cost, speed and quality; there is also a human side associated with BPR. This study is interested in an odd dimension of this human side: top managers' emotional and spiritual intelligence. More precisely, top managers' emotional and spiritual intelligences are believed to be related with their ideas about the targets and critical success factors of BPR. This study not only scrutinizes this belief, but also fills in a great gap as the literature does not offer a similar research. The operationalization stage of the study includes data from top managers of businesses in İkitelli Organized Industrial Zone (OIZ) and the findings clearly point out that top managers' spiritual intelligence is strongly and positively related with their ideas about BPR whereas there is no connection between their emotional capabilities and their mentioned ideas.

**Keywords:** business process reengineering, emotional intelligence, spiritual intelligence, top managers, Turkey

## 1. Introduction

Business literature pays a special attention to top managers for many reasons. They are the ultimate decision-makers in any business, thus they have great influence on business issues and business survival itself. The integrative nature of the business context necessitates these people's skills to step in for various managerial issues such as conflict, risk, financial, human resources, technology, change, communication, marketing, accounting, innovation, and manufacturing management. In other words, the phrase *manage everything* is truly a natural phenomenon for top managers. This phenomenon, moreover, is not actually limited to formal issues, the social feature of the business context necessitates top managers to take informal aspects (organizational culture, climate, citizenship behavior…) into account. Despite the presence of a vast scientific struggle to regard top managers in relation with these informal aspects of the business, there is tender research to evaluate the possibility of relationships among top managers' psycho-social features, informal issues of the business, and business operations. The research further becomes rare if the emphasis is on the relationships between top managers' psycho-social features and formal business issues solely.

The current study makes a contribution to these studies and the contribution is tightly connected with a contemporary business subject: Business process reengineering (BPR). Current business world moves away from the classical assumptions of the contingency approach due to vast and sudden changes that may happen anytime, anywhere. This truth compels top managers to be ready for grand organizational changes to match their businesses with the current, but more importantly, with possible future contexts. An easy prescription for such changes is the facilitation of BPR. BPR's detailed focus on business operations and superficial approach towards psycho-social aspects of the business cause it to be considered as a technical tool. On the other hand, BPR requires worker and manager commitment and the top managers must actively lead this process. The authors of the current study expect this requirement, especially the need for top management, to be an interesting starting point to scrutinize the existence of relationships between top managers' psycho-social features and BPR. Due to the availability of measurement and operationalization purpose, top managers' emotional and spiritual

intelligences are used as the proxies for their psycho-social features. As these people are expected to direct BPR, their ideas about this process are also asked. Briefly, the main concern is an investigation of the existence and properties of the relationship between their two types of intelligence and their ideas about BPR.

## 2. Business Process Reengineering (BPR): Definitions and Importance

There has been a vast interest towards automatization of industrial and commercial activities in the last few decades. This interest provoked a great deal of focus on some technical aspects of many subjects such as cost formation and allocation, manufacturing, effectiveness, efficiency, and quality. On the other hand, the success of this interest has been questioned especially in the 1980s (Loveman, 1988), which has started to be answered in the late 1990s with the general claim that business performance can actually be increased (Srivastava, Shervani, & Fahey, 1999). The possibility of performance superiority encouraged many businesses to implement automatization, but the contemporary survival and competition required more radical approaches to overarch the limits of sole automatization, thus more complicated and inclusive implementations such as activity-based costing (e.g. Malmi, 1999) and total quality management (Powell, 1995) have started to be facilitated by many businesses, albeit these are claimed to be futile attempts in this current globalized business world (Barouch & Kleinhans, 2015).

All these call for even a further radical approach, the Business Process Reengineering (BPR or Business Process Management-BPM), which has actually been voiced since 1990s (e.g. Hammer & Champy, 1993) and is still uttered today (e.g. Jeston & Nelis, 2014). Basically, BPR is a set of radical changes on business processes with a target: dramatic increases of fundamental business performance measures such as cost, quality, service or speed (Hammer & Champy, 1993). These business processes are not limited to be physical; informational aspects are also considered, and information production and distribution processes are simultaneously emphasized (Davenport & Stoddard, 1994). BPR is not solely a technical concept; management philosophy should shift from a one-track mind towards radicalism (Weske, 2012), which makes innovation a vital matter (Goksoy, Ozsoy, & Vayvay, 2012). Although the mentioned shift is posited to render BPR a management tool according some scholars (e.g. Grover & Malhotra, 1997), BPR is extensively defined as the system, which includes radical changes in all business processes while considering external environment to achieve competitive superiority in terms of cost, quality, customer satisfaction and many other issues (Stahl, 1998). This definition accepts that BPR is too wide to fit into the management realm solely (Drucker, 1993) and the changes or re-makings of the business processes are not enough, the relationships with the external environment must also be re-configured (Talwar, 1993). In this case, BPR can be perceived as an agent of organizational change.

This change is performed to have competitive superiority as mentioned, and the facilitators of superiority include methods to reduce costs, optimize resource utilization, shorten product development and introduction processes, and use total quality management effectively; all of which are essential to create value for customers (Vantrappen, 1992). More specifically, BPR includes methods such as process visualization (Martinsons, 1995), change management (Kettinger, James, Teng, & Guha, 1997), process simulation (Zarei, 2001), benchmarking (Tka & Ghannouchi, 2014), project management (Grover, 1999), and process measurement (Keong, 2013), which cross-functionally aim to remake or at least update each business process so that every activity starts to create an extra value while business members are empowered (Al-Mashari & Zairi, 2000). The accumulation of added values creates an organization-wide aggregated value and this value is a strategic asset in order to provide competitive advantage. Therefore BPR is an agent of organizational change, but is also an agent of process-specific and organizational-level value creation tool. Its holistic feature prods the business into action in order to find or develop new capabilities, build or alter strategies, and make changes related to markets, products, or both (Thyagarajan & Khatibi, 2004), thus BPR is simply crowned as a strategic tool.

All the facts explained so far point out that BPR can broadly be summarized as a technical issue involving the combination of process re-design, value creation and the use of information technology (Reijers & Mansor, 2005) with some social aspects in terms of management and worker capabilities (Farrell, 1994). Despite its focus on technical features, BPR's human side is actually posited to be the most important point as people are behind every of its features. Being strategic, BPR starts with the intentions of top management and is actively applied by other business members, especially by workers. The key element is *change* in BPR, thus the attitudes of top managers and workers towards this change determine the fate of BPR. The premises of these attitudes are expectations from the change (Mossholder, Settoon, Armenakis, & Harris, 2000) and the coherence between these expectations and perceived results obtained (Smith, 2005). The fear that managers or workers have for the change should be directed before implementing BPR, thus positive attitudes should be developed (Lines, 2005) so that workers (Morris & Brandon, 1993) and managers (Amanquah & Adjei, 2013) can fully commit themselves. Shortly, an organization-wide commitment is vital for BPR's success.

For this commitment, key people of the business with regards to BPR can be determined in advance and can be convinced in favor of BPR (Stanton, Hammer, & Power, 1992). These key people, whether managers or technical staff, may later be effective to encourage cooperation of others in the business. All business members can be convinced that the change that comes with BPR does not jeopardize their situations by involving everyone in the process and by using positive communication (Marjanovic, 2000). This involvement may be in the form of BPR teams, which consist of BPR insider and outsider business members as well as professional BPR consultants (Attaran, 2000). Positive effects of BPR on the business and these effects' individual reflections can also be explained to business members (Benner & Tushman, 2003).

Managers must extensively be emphasized in this process. Similar to workers, managers may be afraid of losing their power, the status quo, or even their jobs (Ahadi, 2004), thus the solutions proposed in the prior paragraph can also be applied to empower management commitment. When the top management is the subject, however, commitment becomes more crucial than ever. BPR is a top-down issue (Janson, 1993), and the top management is the starting point alas management alone is not sufficient for BPR success. As mentioned, there can be a resistance to the change of BPR, and the solutions not only include technical aspects, but also an influential communication. This fact necessities a versatile leadership style along with dynamic managerial skills at top management level (Janson, 1993). Put other way, top managers should be capable of changing their current ideas, behaviors, and therefore their attitudes for the sake of BPR, should be motivated and should have independent-thinking skills; thus be able to perform variable, non-programmable tasks (Sutcliffe, 1999). These changes affect how managers form and deploy business strategies, appraise and reward performance, share business-related knowledge, and communicate (Attaran, 2000).

## 3. The Significance of Emotional and Spiritual Intelligence

Emotional and spiritual intelligence are prominent issues in the literature. Emotional intelligence (EI), which is an older subject than spiritual intelligence (SI) (Ayranci, 2010), is defined in many ways and is much scrutinized by scholars. This intelligence is first taken into consideration by Payne (1985) and is strictly limited to be the capability of coping up with basic emotions such as fear and desire, and the feeling of pain. After being almost untouched for approximately five years, Salovey and Mayer (1989) are the first to offer a scientific model in order to study EI deeply and they contend that EI is actually perceiving, decoding, using, and managing emotions. This definition is later followed by many others. A simple definition that belongs to Martinez (1997) posits that it is the ability of an individual to correctly and dynamically assess own emotional reasoning. Other scholars consider EI to be the ability of effective emotional perception (e.g. Elfenbein, Der Foo, & Boldry, 2006), and successful emotional appraisal (Innes-Ker & Niedenthal, 2002).

This variety of definitions is also similar to the variety of measurement approaches. There are multi-dimensional instruments such as EQ-I (Bar-On, 1997), and there exist some uni-dimensional and more specific tools-Emotional Stroop Test (Richards, French, & Johnson, 1992), for example. There are also context-based modified versions of these instruments (e.g. Matsumoto, LeRoux, Wilson-Cohn, Raroque, & Kooken, 2000; Ayranci, 2010).

The business context accentuates either managers or workers if EI is the question. The results achieved about workers are generally positive-EI helps workers to fight job-related stress (Jordan et al., 2002), increases the effectiveness of mentoring (Chun, Litzky, Sosik, Bechtold, & Godshalk, 2010), and is very effective on workers' performance (Lopes, Grewal, Kadis, Gall, & Salovey, 2006). The results about managers are also affirmative. EI is a facilitator in leadership process (Goleman, Boyatzis, & McKee, 2013); is a vital factor of managers' health and performance in the business context (Slaski & Cartwright, 2002); can be effective in increasing managers' performance by reducing managers' work-family role conflicts (Carmeli, 2003), conflicts with workers (Schlaerth, Ensari, & Christian, 2013), and conflicts due to cultural differences (Gabel, Dolan, & Cerdin, 2005).

This study involves BPR, which is an overall organizational change and considers top managers. Therefore, it is important to precisely shed light on managers' EI-organizational change relationship. The literature points out that EI of managers becomes important if the issue is the change of organization. The change, as mentioned before, should be initiated and managed while keeping an eye on innovation. Creativity is the premise of innovation and it is especially inspired by managers' EI. It is argued that this inspiration can be made towards many issues such as workers' identification, information gathering and distribution, idea generation and sharing, and idea implementation with the aim of successful organizational change (Zhou & George, 2003).

The literature on leadership and change further stresses EI's importance. Transformational leadership is required for organizational change and EI is an inseparable ingredient of this leadership type (Sosik & Megerian, 1999). A transformational leader can use own EI to gain legitimacy among workers in favor of organizational change

(Smollan, 2011). This acceptance particularly results with a very bright organizational change when the leader possesses appropriate communication and empathy skills (Cook, Macaulay, & Coldicott, 2004). Emotional expression capability can also foster visionary leadership to set up the path for organizational change (Groves, 2006), thus EI is also effective to map out how and to where the change will stir.

A summary for managers' EI-BPR relationship can be made at this point. Though some scholars (e.g. Liu & Ma, 2012) consider BPR as a technical issue, some other scholars (e.g. Marjanovic, 2000; Goksoy et al., 2012) add psycho-social facts while subjecting BPR and a further step is the notion that emotional capabilities are effective players in the design (Becker, Kugeler, & Rosemann, 2011) and implementation (Caya, Brunelle, Leger, & Grebot, 2012) processes, and thus the success of BPR. All these processes result in an overall change and it has to be managed, which in turn, highlights managers' skills (Boeker, 1997) and exclusively their emotional capabilities (Attaran, 2000) as these capabilities-especially when leadership is applied in favor of BPR (Ahadi, 2004)-can enamor managers' commitment to BPR (Crowe, Fong, Bauman, & Zayas-Castro, 2002) and be used to convince workers in favor of the change, which BPR brings with (Zaheer et al., 2010).

The other intelligence, spiritual intelligence (SI), is a newer issue for business context. The business context in fact makes it odd to consider spirituality and spiritual intelligence (SI) at first. A literature review, however, points out that there are indeed attempts to relate business with spiritual issues. A noteworthy example in this sense is the workplace spirituality, which is referred to as being in a positive mood in the workplace (Shaw, 1999) via the use of religiosity (Fernando & Jackson, 2006), a combination of religiosity and psychology (Sutcliffe & Bowman, 2000) or maybe none of these (Briskin, 1998). Some scholars also posit that spirituality and religiosity should be separated in general (e.g. Dowling et al., 2004) and in the business context (e.g. Ayranci & Semercioz, 2011).

At the beginning of 2000s, spirituality starts to be questioned and scholars (Emmons, 2000) claim spirituality to be a distinct type of human capability. Similar to consciousness, SI is defined as an individual's capacity to have a sense of sacredness, virtue, and the awareness that everything is interconnected in the universe (Emmons, 2000). Other than this definition, it is simply considered to be the capacity to question the reasons of everything (Sisk, 2008) or the capability to connect to a higher power, who is the main source of every entity (Vaughan, 2002).

Spiritual intelligence or even distinct spiritual capabilities are very new concepts in the literature, thus there are very few instruments available. Examples include Psycho-Matrix Spirituality Inventory (PSI) (Yang & Mao, 2007), Spiritual Intelligence Scale (SIS) (Tirri, Nokelainen, & Ubani, 2006), and Integrated Spiritual Intelligence Scale (ISIS) (Amram & Dryer, 2008).

Besides being new, difficulties to relate spirituality with business issues resolve the SI research in business context even harder. Very few studies find out that top managers' spiritual capabilities are partly effective on the business performance (Ayranci, 2010), spirituality and spiritual capabilities are different when top managers are considered (Ayranci & Semercioz, 2011), spiritual leadership features of the family member top managers can affect their family businesses (Dede & Ayranci, 2014), this intelligence is beneficial in the process of transformational leadership development (Hasani, Alam, & Sepasi, 2013), and managers' spiritual capabilities can be used to inspire workers towards organizational goals (Zarei Matin, Kheirandish, & Jahani, 2010). Shortly, spiritual capabilities are important actors of management and leadership. Like the case with EI, managers' SI or at least workplace spirituality are denoted to affect organizational changes positively (e.g. Fry & Cohen, 2009) and therefore, SI is expected to be related to BPR.

## 4. Methodology

As mentioned before, the main purpose of this research is to find out traces of relationships among top managers' EI, SI, and their ideas about BPR, which is modeled in Figure 1. A questionnaire is prepared and applied to top managers of the businesses in the biggest organized industrial zone (OIZ) of Turkey, the İkitelli OIZ, which hosts 27301 businesses (IOSB, 2012). The sample size is calculated to be 379 with a 5% margin of error and 95% confidence level (Raosoft, 2004). Because of possible obsolete or missing data, 400 questionnaires are used for data collection process. This process is performed with the help of a professional consulting firm, which applies the questionnaires and returns the filled-in questionnaires to the authors. As per request of the authors, the firm also provides a list of the participants with their contact information. The authors phone each participant to check whether the questionnaires are really applied.

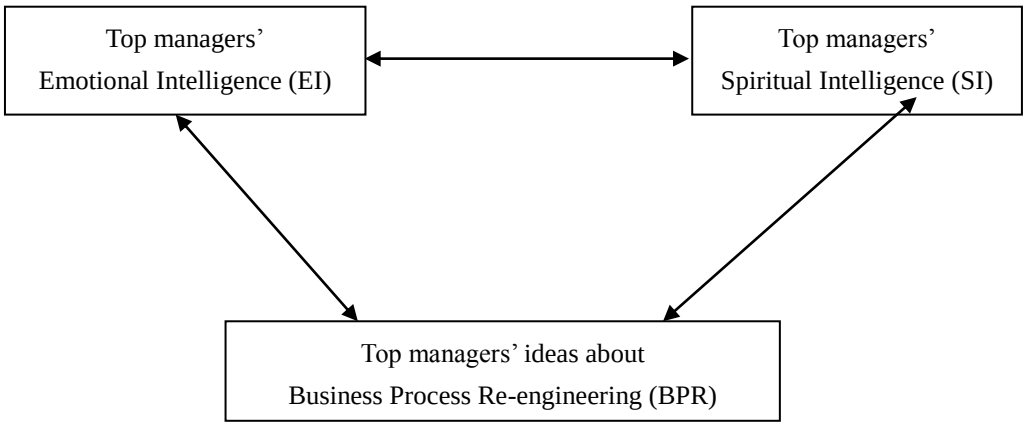


Figure 1. The proposed research model

The authors also consider that the top managers of big businesses should solely participate in the research for the sake of more realistic data collection. In other words, small and medium-sized enterprises (SMEs) are posited to have great difficulties for BPR facilitation (Browne & O'Sullivan, 2013) especially in the Middle Eastern context (e.g. Imanipour, Talebi, & Rezazadeh, 2012), thus the possibility of BPR planning and implementation decreases when SMEs are focused rather than big businesses. This urges the authors to expect that managers of SMEs may have wrong, prejudiced or missing information regarding BPR and thus, they may show reluctance while filling in the questionnaires. Because of this expectation, the formal definition of SME in Turkey (Official Gazette, 2012) is written at the top of the questionnaire and the participating top manager is asked to evaluate own business accordingly. The answers are noted only if the business is not considered to be an SME by the top manager. This greatly limits the number of businesses and 126 questionnaires with a negative response to the SME definition are taken into consideration.

After a short introduction and the SME definition, the questionnaire starts with the items of spiritual and emotional intelligence. SI items originally belong to Amram and Dryer's (2008) Integrated Spiritual Intelligence Scale while EI items are taken from EQ-I, which is developed by Bar-On (1997). The prior research (e.g. Ayranci, 2010) proof that these constructs can not completely be used as-is in the Turkish context force the authors to perform explanatory factor analyses. The top managers' ideas about BPR are twofold: what the aim of BPR should be and what critical factors are vital for BPR. A combination of the studies of Al-Mashari and Zairi (1999), and Jinjiri et al. (2012) is made to consider BPR. Again, an exploratory factor analysis is performed to find out the statistical structure of ideas about BPR. All these analyses are performed in the form of principal components analysis with varimax rotation. Factor loadings smaller than 0.5 are suppressed.

Initial findings suggest that SI of the top managers is made up of two factors, which aggregately explains 57.905% of the overall data. Participants' EI, on the other hand, is divided into three factors, which can cover 69.098% of all data. The factor loadings of the items and the results of reliability analyses are given in Table 1.

Table 1. Results of the explanatory factor and reliability analyses of top managers' SI and EI

| **SI Factors** | **Higher Consciousness (SI_HIGH)** | **Self-Consciousness (SI_SELF)** |
|---|---|---|
| **Availability for explanatory factor analysis** | **KMO Value: 0.894 Bartlett's test value is statistically significant.** | |
| **Variance explained (%)** | **30.866** | **27.039** |
| **Cronbach's Alpha Value** | **0.847** | **0.852** |
| **Overall Cronbach's Alpha Value** | **0.914** | |
| I am aware of a wise- or higher-self in me that I listen to for guidance. (SI_H1) | 0.777 | |
| In my day-to-day tasks, I pay attention to that which cannot be put into words, such as indescribable sensual or spiritual experiences. (SI_H2) | 0.733 | |
| I listen deeply to both what is being said and what is not being said. (SI_H3) | 0.725 | |
| I listen to my gut feeling or intuition in making important choices. (SI_H4) | 0.672 | |

| | | | |
|---|---|---|---|
| I have a daily spiritual practice - such as meditation or prayer - that I draw on to address life challenges. (SI_H6) | | 0.536 | |
| My goals and purpose extend beyond the material world. (SI_H5) | | 0.523 | |
| I am mindful of my body's five senses during my daily tasks. (SI_S1) | | | 0.840 |
| I look for and try to discover my blind spots. (SI_S2) | | | 0.697 |
| I find ways to express my true self creatively. (SI_S3) | | | 0.615 |
| I derive meaning from the pain and suffering in my life. (SI_S4) | | | 0.606 |
| I restrict myself. (SI_S5) | | | 0.580 |
| Being right is important to me. (SI_S6) | | | 0.553 |
| **EI Factors** | **Adaptability (EI_AD)** | **Interpersonal: Relationships (EI_REL)** | **Interpersonal: Empathy (EI_EMPAT)** |
| **Availability for explanatory factor analysis** | **KMO Value: 0.743 Bartlett's test value is statistically significant.** | | |
| **Variance explained (%)** | **27.722** | **22.164** | **19.212** |
| **Cronbach's Alpha Value** | **0.833** | **0.790** | **0.856** |
| **Overall Cronbach's Alpha Value** | | **0.762** | |
| It is easy for me to adapt to new conditions. (EI_A1) | 0.841 | | |
| I can change my old habits. (EI_A2) | 0.799 | | |
| It is hard for me to change my style. (Reversed) (EI_A3) | 0.731 | | |
| I can pull away from my dreams rapidly and turn to the reality of the situation easily. (EI_A4) | 0.702 | | |
| When solving a problem, I inspect every possibility, and then decide the best. (EI_A5) | 0.662 | | |
| My approach to cope with difficulties is to move step by step. (EI_A6) | 0.640 | | |
| I can tell people what I think easily. (EI_INTR1) | | 0.895 | |
| When I don't agree with someone, I can tell this to him / her. (EI_INTR2) | | 0.887 | |
| When I am angry with others, I can tell this to them. (EI_INTR3) | | 0.796 | |
| I easily notice others' emotional needs. (EI_INTE1) | | | 0.842 |
| I understand the emotions of others very well even if they don't express them directly. (EI_INTE2) | | | 0.818 |
| I can be aware of people suffering. (EI_INTE3) | | | 0.810 |

Although the statistical structures of SI and EI are different than the ones emerged in Ayranci's (2010) study, some factors are preserved. SI is composed of the higher consciousness, which unveils the belief towards immateriality and a higher self-being, and the self-consciousness, which is actually related to the participants' knowledge and awareness about oneself. EI includes the adaptability capability of the participant while interpersonal aspects address the participants' capacity to recognize others' emotions and the extent to which the participant can frankly interact with others.

The next step is to find out how the ideas of top managers about BPR are shaped. Table 2 points out that there is a four-tier structure, which explains 55.253% of the total variance and confirms that the factors and the whole structure are reliable.

Table 2. Results of the explanatory factor and reliability analyses of top managers' ideas about BPR

| | Strategic Dimension (BPR_ST) | Change Dimension (BPR_CH) | Operational Dimension (BPR_OP) | BPR Aims (BPR_AIM) |
|---|---|---|---|---|
| **Availability for explanatory factor analysis** | **KMO Value: 0.679 Bartlett's test value is statistically significant.** | | | |
| **Variance explained (%)** | **15.451** | **14.624** | **13.766** | **11.412** |
| **Cronbach's Alpha Value** | **0.674** | **0.704** | **0.611** | **0.568** |
| **Overall Cronbach's Alpha Value** | **0.649** | | | |
| Top management support is vital for BPR success. (B_ST1) | 0.730 | | | |
| Leadership is vital for BPR success. (B_ST2) | 0.720 | | | |
| Work environment and culture is vital for BPR success. (B_ST3) | 0.641 | | | |
| Quality improvement system is vital for BPR success. (B_ST4) | 0.550 | | | |
| Technology transfer and use is vital for BPR success. (B_ST5) | 0.518 | | | |
| Acceptance and performance of change management is vital for BPR success. (B_CH1) | | 0.839 | | |
| New process, product and service design or development is vital for BPR success. (B_CH2) | | 0.672 | | |
| People skill interchangeability is vital for BPR success. (B_CH3) | | 0.653 | | |
| Resource value addition process is vital for BPR success. (B_CH4) | | 0.599 | | |
| Productivity improvement is vital for BPR success. (B_OP1) | | | 0.742 | |
| Resource preservation and utilization is vital for BPR success. (B_OP2) | | | 0.722 | |
| Managing resistance to change is vital for BPR success. (B_OP3) | | | 0.652 | |
| Optimally utilizing the resources and reducing costs, and leading to reduction in operating budget should be BPR's target. (B_AIM1) | | | | 0.818 |
| Formulating practical targets (business process goals), and focusing on achieving end results and objectives should be BPR's target. (B_AIM2) | | | | 0.641 |
| Use of time as a competitive weapon (by decreasing cycle time and optimally utilizing man-hour) should be BPR's target. (B_AIM3) | | | | 0.591 |

Factors in Table 2 are named according to Al-Mashari and Zairi (1999), and Jinjiri et al.'s (2012) studies. A noteworthy outcome is that the top managers attribute a significant importance to managerial dimensions of BPR. Another eye-catching point is the emphasis on human side of BPR almost in every factor. All these are promising for the authors as their expectations to come up with some relationships among EI, SI, and ideas about BPR rise.

The final step is to investigate these expected relationships. The investigation is performed by structural equation modeling (SEM) and second-level latent variables are used after the proposed model in Figure 1 is further expanded. The expanded model is presented in Figure 2.

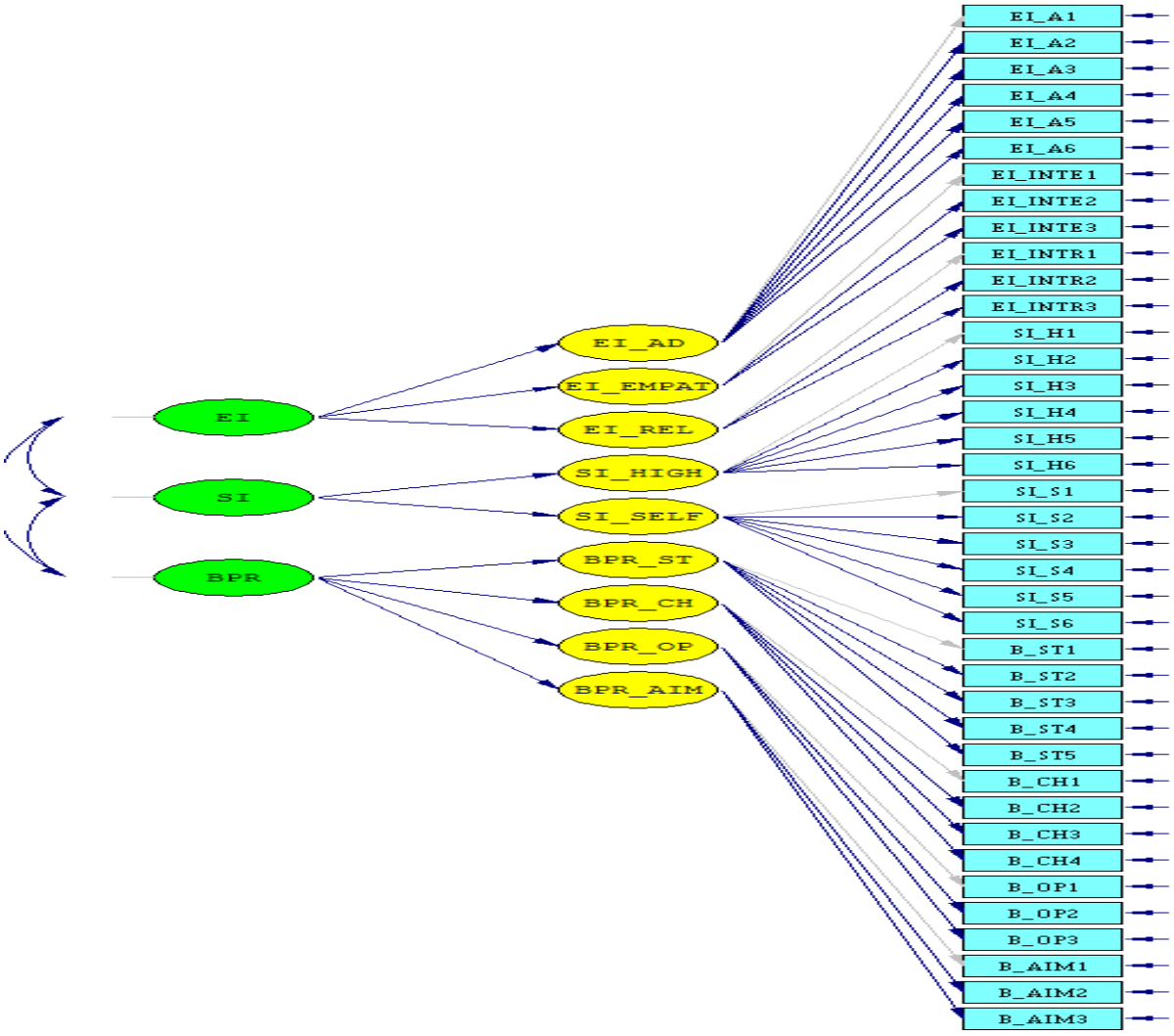


Figure 2. The proposed research model (Expanded)

(See Tables 1 and 2 for abbreviations)

The expanded proposed model seems to be realistic (RMSEA: 0.072 and stem-leaf and Q-plots of standardized residuals denoting a normal distribution in Figure 3).

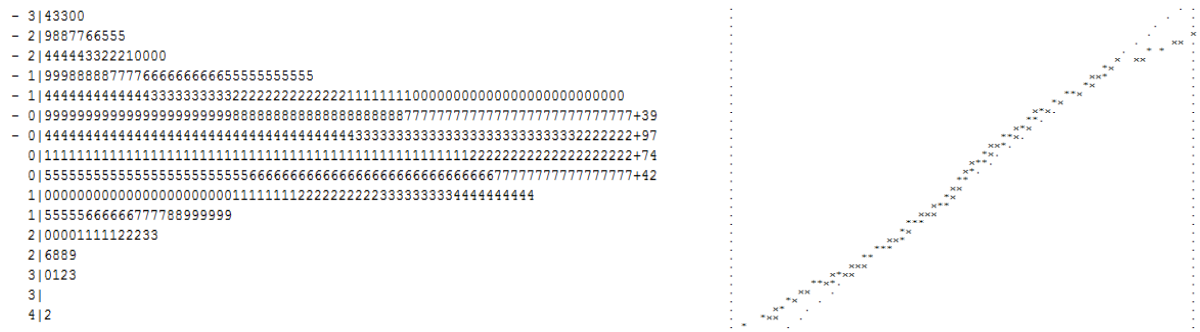


Figure 3. The Stem-Leaf and Q-Plots of standardized residuals

Despite being realistic, an instant finding is that the operational dimension is not significantly related to BPR when the entire model is assessed (Equation 9). In other words, the participants solely note the strategic and change dimensions, and the aims of BPR when BPR is to be considered in relationship with their emotional and spiritual intelligence.

(EI) Adaptability = 0.092*Emotional Intelligence, Errorvar.= 1.06, $R^2$ = 0.0080 (1)
(0.025) (0.20)
3.66 5.37

(EI) Interpersonal, Empathy = 0.078*Emotional Intelligence, Errorvar. = 0.91, $R^2$ = 0.0066 (2)
(0.025) (0.27)
3.12 3.32

(EI) Interpersonal, Relationships = 0.44*Emotional Intelligence, Errorvar.= 0.11, $R^2$ = 0.63 (3)
(0.088) (0.042)
4.99 2.56

(SI) Higher Consciousness = 0.98*Spiritual Intelligence, Errorvar. = 0.29, $R^2$ = 0.95 (4)
(0.15) (0.042)
6.42 6.86

(SI) Self-Consciousness = 0.96*Spiritual Intelligence, Errorvar.= 0.33, $R^2$ = 0.85 (5)
(0.19) (0.081)
5.15 7.59

(BPR) Strategic Dimension = 1.09*Ideas about BPR, Errorvar. = 0.92, $R^2$ = 0.83 (6)
(0.30) (0.39)
3.59 23.59

(BPR) Change Dimension = 0.60*Ideas about BPR, Errorvar. = 1.93, $R^2$ = 0.16 (7)
(0.17) (0.47)
3.58 4.09

(BPR) BPR Aims = 0.79*Ideas about BPR, Errorvar. = 0.11, $R^2$ = 0.23 (8)
(0.039) (0.046)
8.52 2.59

*(BPR) Operational Dimension = 0.14*Ideas about BPR, Errorvar.= 2.59, $R^2$ = 0.0073* *(9)*
*(0.20) (0.97)*
*0.70 2.66*

The equations also reveal that some of the relationships between the factors and their respective concepts are weak. The *interpersonal relationships* seems to be the most active factor within EI, and this suggests that the participants-the top managers-pay most of their attention to human interactions. Its relationship with EI is also positive, therefore the top managers posit that it contributes positively to their emotional capabilities. Though the two other factors, adaptability and empathy have weaker relationships with participants' EI, their contributions are also positive. The factors of SI, self and higher consciousness, have positive and strong relationships with SI. Thus the top managers unveil their awareness about a higher power and their own beings when these are included within the overall model. Contrary to emotional and spiritual intelligence, BPR is taken into account by solely three factors in the model as already mentioned. Of these, strategic dimension is the most powerfully connected factor with the ideas about BPR and its contribution is also notably higher when compared with the other factors. The authors consider that the findings about the ideas related to BPR are very much expected. Precisely, it is natural for the top managers to mostly emphasize the strategic dimension of BPR as they are already the members of their businesses' strategic cadre. This cadre also necessitates taking on duties for an overall organizational change and thus, the change dimension should be regarded. The strategic cadre obligates an overall look on the business and the operations of BPR are generally lower management's duty; thus the operational dimension is not much catchy for the top managers. Finally, the aims of BPR affect the entire business, and this can cause the top managers' interest to accumulate on these aims.

The final step is to check the proposed model, the relationships among SI, EI and the ideas about BPR. The correlations presented in Table 3 point out that the top managers' emotional and spiritual intelligence are not connected when the proposed model is tested. Their emotional intelligence, moreover, is not related with their ideas about business process reengineering. On the other hand, there is a positive and strong correlation between the top managers' spiritual intelligence and their ideas about business process reengineering.

Table 3. The relationships among the top managers' emotional and spiritual intelligences, and ideas about BPR

| | Emotional Intelligence | Spiritual Intelligence | Ideas about BPR |
|---|---|---|---|
| **Emotional Intelligence** | **1.00** | | |
| | -0.02 | | |
| **Spiritual Intelligence** | (0.02) | **1.00** | |
| | -1.00 | | |
| | 0.00 | 0.75 | |
| **Ideas about BPR** | (0.02) | (0.06) | **1.00** |
| | -0.18 | 15.22 | |

The authors believe that Table 3 indicates many implications. The top managers' EI is made up of their adaptability capacity and their interpersonal skills. The authors consider that the technical nature of BPR (with its strategic and change dimensions along with technical aims) may be responsible for EI-BPR disconnection-the top managers may have simply not found a common or a similar point between their emotionality-based psycho-social capacities and the technical aspects of BPR. Another implication is about the two intelligences, the top managers consider emotional and spiritual intelligences to be distinct capacities. This outcome is not expected by the authors, especially when there are proofs for their connections in the literature (e.g. Ayranci, 2010). It is, however, important to recall that their connection is checked in an integrative model, proposed for the first time in this study. Therefore the authors believe that the holistic and integrative nature of the model may be a cause for this disconnection. Another possibility may be about the technical content of the ideas about BPR; this content may have blurred the focus on human side and thus the possible connections between these two intelligences. A last possibility for this disconnection may be related to references. Both emotional and spiritual intelligences directly address the top manager, whereas the ideas of the top managers about BPR directly address the business. This difference in addressing may have led the participants to assume that their intelligences' connections and their ideas about BPR are completely separate issues.

A final and a very interesting finding is that the top managers' spiritual intelligence and their ideas about BPR are related with each other, and moreover, this is a positive and strong relationship. Though the authors expect both intelligences to be simultaneously related with the ideas about BPR; emotional intelligence's disconnection and spiritual intelligence's connection exactly puzzles the authors at first, albeit the contents of spiritual intelligence and the ideas about BPR decrease this confusion.

Spiritual intelligence includes the self and higher consciousness. A detailed look reveals that higher consciousness is made up of top managers' prescription for guidance; sensuality and spirituality for routine tasks, decision-making, listening, addressing challenges, and personal goals. All of these can briefly be named as the top managers' use of spirituality for their own actions and decision-making processes. The three factors that make up the ideas about BPR belong to these participants and these factors propound that BPR is profoundly a top management duty. These inferences lead to the thought that the top managers are willing to articulate a connection between their spirituality capacity and their BPR duty.

The other factor, self-consciousness, is about the top managers' awareness of own weaknesses and senses, personal life interpretation and restriction, emphasis on being right, and own expression. These issues aggregately point out top managers' self-awareness, and similar to the case with the higher consciousness, the top managers deliberate a connection between their perceptions of own features and their possible compulsion of leading the BPR process.

## 5. Conclusion and Recommendations

This study addressed a relationship with a unique nature-between top managers' emotional and spiritual capacities, and their ideas about a technical matter: BPR. This human and technical aspects' relationship analysis revealed an interesting result. The top managers' own adaptability, empathy and open communication capacities are not related to their ideas about BPR. On the contrary, spiritual issues-the self and higher consciousness-are related with the ideas about BPR and the reason is considered to be top managers' belief that own spirituality and self-recognition should be taken into account if BPR's strategic and change dimensions along with its aims are to be decided by their own.

The mentioned unique nature resolves this study a preliminary research and there is no any other study to make a comparison. A quick suggestion, in this case, is to test the proposed model in various contexts such as different

organized industrial zones, sectors and business types. Besides an extensive research on any possible effects of these different contexts, the same model can also be tested in the international environment, thus country-based comparisons can be performed. The model can further be expanded and issues such as religiosity, social and organizational culture, and organizational climate may be added in. In other words, any relationship between the technical issues of BPR and psycho-social aspects can overarch the dominance of top managers' emotional and spiritual capacities. Considering different participants may also be noteworthy; BPR specialists are the immediate obligators of the process and therefore an analysis of their intelligences' connections with their attitudes towards BPR may uncloak absorbing results. The model tests may also be performed across top manager, middle level manager, and specialist groups in order to catch similarities or differences. All these implications and suggestions lead to a specific point: human side of BPR should extensively be scrutinized and this probe should involve spiritual issues in the workplace.

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# A Propitious Approach towards Independent Directors in Malaysian Firms' Board Committee

Michael Tinggi[1], Abu Hassan bin Md Isa[1] & Shaharudin Jakpar[1]

[1] Department of Finance and Accounting, Faculty of Economics and Business, University Malaysia Sarawak, Kota Samarahan, Sarawak, Malaysia

Correspondence: Michael Tinggi, Department of Finance and Accounting, Faculty of Economics and Business, University Malaysia Sarawak, 94300, Kota Samarahan, Sarawak, Malaysia. E-mail: tmichael@feb.unimas.my

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**Abstract**

Independent directors at board committee have never taken a center stage, until when the world economy faced a global financial crisis stretching from the late 1990s to the late 2000s. Corporate governance ultimately calls for more controls and checks to be exercised at the board and committee level. Monitoring by independent directors of the top level management, is now viewed with more propitiation, complementing existing auditing activities, nominating and evaluating compensation to executive directors. The propitious approach is being interpreted as accepting independent directors favorably by increasing their representation at the board room and committee, which may be translated towards profit generation. A panel white standard error from an estimated 30 percent of the total Malaysian firms for period of 10 years suggests that nomination and remuneration committee gear the company towards generating profit.

**Keywords:** propitious approach, independent directors, board committee, corporate governance and profit generation

## 1. Introduction

### *1.1 Background*

A board room with independent directors' audience has been exercised as early as mid 1980s in United States and Europe. In the Asian region or Malaysia in particular, prior to the Asian financial fallout it has not taking up the center stage of the management attention. Without doubt questions are raised, as to the amount of cost in obtaining and engaging the service of independent directors. Over the years, it is observed that there has been much development as to the appointment of independent directors both at board level and audit committee. Particularly in Malaysia, the firms are seen to have viewed independent directors more propitiously, with increased composition of independent directors at the board room and board committee. These directors sitting at the board-room and board committee are anticipated to bring about more independent and meaningful judgment to business decisions. Subsequently it may contribute to a more effective boards' deliberation and decision making process (Tinggi et al., 2014). An effective board room and board committee may help to drive the organization to achieve better quality decision, a more open financial reporting and subsequently expected to improve audit process and output (Beasley et al., 2009; Turley & Zaman, 2007; Zaman et al., 2011). Independent or outside directors in the organization are not on full time basis. Their audience can only be felt when they come for board meeting or carrying out the monitoring activities of the board committee, and certainly are not privilege to a fixed compensation. The amount of time spent with the company is limited and access to information is certainly constrained. Consequently, it will be more difficult for independent directors to exercise diligent judgment. Being assigned as monitoring agent at the board room and committee level in order to oversee the activities of the senior management is indeed a daunting task to independent directors. Firms are more familiar with the commonly prescribed role of both internal and external auditors, who are engaged to ensure that internal control is taking place and that compliance in the preparation and reporting of financial statement is accomplished effectively. While firms are obliged to pay hefty normal auditing fees, those firms are now equally instituted to pay monitoring fees to independent directors who are expected to assume the responsibility of a monitoring agent, this time round, both at the top or strategic management level. Independent directors would perform the duty of their oversight role which is distinct from the role assigned to the senior management

executives. In the exercise of the independent directors' duty, they are expected not to display any form of biasness and partiality to any parties, when conducting monitoring activities or valuing managerial performance of the organization's top executive. While there is no obligation to institutionalize statutory compliance, the corporate governance code of best practice recommends that independent directors are strongly encouraged to exercise independent judgment and impartiality in the decision-making process than members of the top management executives, comprising the Chief Executive Officer (CEO) and the other executive directors.

The 1997's Asian financial crisis in countries such as Indonesia, Thailand, Philippines and South Korea has triggered the interest of the national governments and corporate leaders. Weakness of the national and firm financial structures was severely exposed and identified. Huge financial losses that were unseen before were reported. Foreign funds that were invested in the equity portfolio and commercial bank loans brought about negative returns. An original sum of US$12.1 and US$55.5 billion invested in the Asian regions resulted in a negative US$11.6 and US$21.3 billion respectively (Poon & Perry, 1999). The demise of a United State energy company, Enron, saw its corporation market value shrank from US$90 per share in 2000 to less than US$1.00 in October 2001, representing a significant drop of 99 percent. It was followed by a magnitude of job losses, directly and indirectly, of 6,500 and 28,000 respectively in Arthur Andersen's US operation (Dugan & Spurgeon, 2002). Subsequent to this, also saw the downfall of WorldCom, which has resulted in massive job losses of 17,000 employees, with its market value shrinking from US$60 in 1999 to US$2.00 per share in March 2002 (Brickey, 2003). The latest straw of melting down was the 2007/2008 subprime mortgage crisis in the United States, exposing more disintegration in the country financial structure. A negative growth of 23.72 percent in the fourth quarter of 2007 in US banking industry was reported, with some US$3.0 trillion in private label structured assets was forced to be liquidated. Subsequently, it deprived the US economy a vast amount of liquidity assets (Whalen, 2008). Investors' confidence in the financial market was severely undermined. In the aftermath of the financial crisis, more financial shocks will be anticipated to happen, if the weakness among financial structure is left unattended. Investors and financial analysts even contemplated that the diluted investors' confidence and unstable financial structure may have aggravated the economic ripple effect in many different parts of the world, particularly such as the current financial instability experienced in Greece, Portugal and Ireland in 2011.

Malaysia was not free from the financial fallout. Confidence among investors and foreign currency managers grew increasingly low, with vast under-valuation in stock market capitalization. In early 1998, the value of ringgit to a dollar took a nose-dive and was reported to have reached its lowest point at 4.88 ringgit to a US dollar, compare to its pre-crisis value of 2.57 ringgit in July 1997. In the same period, the Bank Negara of Malaysia found that it has lost US$10 billion in its effort to shore up the value of Malaysian currency against the US dollar, thus exacerbating the pains already suffered by the Malaysian people. Indeed, two thirds of the value of the Malaysian stock market wealth were wiped out from its last six years of cumulative growth. With the new but a discouraging financial landscape, the governments around the world including Malaysia rushed to introduce new business legislation in a final effort to improve the level of corporate governance practice, and in effect will restore investors' confidence. May be it was the first real attempts to reform a firm which may begin from the top, including the members of the highest decision committee, which is the board. The latter is typically accountable to the fiduciary responsibilities assigned to them in order to safeguard the interest of the shareholders, especially the minorities and ensuring that the well-being of the corporation is taken care of. The inside and executive directors sitting at the board has been critically queried, pertinent to their efficiency and effectiveness as custodian of the company's assets. The inside directors who then, oversee the management activities at the upper level and the evaluation of the firm's senior management and the chief executive officer (CEO) compensation perhaps might have been taken lightly. Early literature from Baysinger and Hoskisson (1990) and Kesner and Dalton (1986), highlighted that the inside directors which are shouldering the responsibility as former monitoring agent may fear the plausibility of harsh negative counter action from the CEO and other senior managements. Consequently it may impede the good cause, capacity and capability of the inside directors to provide an impartial and meaningful monitoring activties. Fleischer, Hazard and Klipper (1988) and Weisbach (1988), also give evidence that inside directors are being dragged into a conflicting position. Their role of evaluating the senior management performance will be questioned, with conflicting objectives, first as members of the decision makers, and second, as evaluator and monitoring figure, which sometimes will affect the role that the director assumes. Subsequently it may interfere with the need to provide an effective discharging of responsibility required from the inside directors. Given the delicate relationship among inside directors which may bring about conflicting objectives and results, justification for engaging outside or independent directors may become more relevant. Outside and independent directors are certainly expected to bring about increased objectivity and clarity to the board decisions making activities. In effect, these efforts would help to improve organisational survival, cultivate firm's growth and prosperity, and silmutaneously

guarding and championing the interest of the general stakeholders (Malaysian Institute of Corporate Governance-MICG, 2003). Having addressed some of the agency threats, independent directors have the opportunity to discern larger issues which is over and beyond the normal profit-making concern of the organisation. In comparison, executive directors may have failed to display indifference and objectivity in the decision making process. The CEO may possibly, from time to time, interferes with the decision, authority and direction asserted by the inside directors. A significant finding by Scarabotti (2009), agrees that the board is not effective in promoting check and balance, if the board is mainly made up of individuals who are maintaining close ties, either directly or indirectly, with the senior executive management. Being objective and independent among directors are important in those areas where there is likelihood that conflict of interest between managers and shareholders may arise. Given the above picture, the appointment of independent or outside directors is foreseen to have brought about more value added to the corporate board, in terms of impartiality, professionalism and effectiveness (Tinggi, 2014). While the appointment of independent directors is required, it is also seen to have increased agency cost, culminating in another monitoring cost that the firm has to bear with. Instead of ameliorating the agency costs, it has otherwise becoming exacerbated. Apart from financial obligations arising from the existing payment to external and internal auditors, firms would have to bear with the additional unavoidable new agency cost. While there is a potential benefit from deploying independent directors, it is also expedient to create the right balance between the number of independent directors engaged by the firm and the responsibility that is assigned to them. The rolling out of corporate governance among countries has made it almost obligatory for firms to fill the board room with independent directors. This has been the most important step culminating from corporate governance, in order to ensure that activities at the strategic level are monitored and overseen responsibly.

This research dwells on the ever green significant fundamental theory such as the agency theory, which will continue to highlight the useful relationship or a nexus of contract between relevant stakeholders, in this case is the investor and the management. A research by Jensen and Meckling (1976) finds that there is conflict of intention and interest between managers and shareholders. This so-called conflict driving the objective of both mentioned parties is expected to be caused by a diversity of interest and asymmetric information unintentionally borne by shareholders who have little or no access to the whole knowledge about the organization. On the other hand, corporate managers might have the personal privilege and motivation to steer the firm for their own self-interest. The managers who are moved by different interests would tend to behave and use the firms' resources based on their own best interest, which may not be in line with the shareholders objective, whose main aim is to maximize return from the shareholders' fund. While firms continue to use the service of internal and external auditors, the result has not been overwhelmingly positive, as firms are still exposed to weak financial structure. A more effective monitoring substance is required, and in the light of this argument, independent directors are strongly recommended. Without doubt the author looks upon the contribution of the Resource dependence theory (Daily, Dalton, & Camella, 2003; Hillman et al., 2009) which would call upon the board members' contribution as boundary spanners of the organization and environment. It is potentially built on the resourceful supply of independent directors, who have acquired wealth of business experience and skills and to take advantage of their collaborative edge that could be assimilated into the organization for good effect. The independent directors are meant to provide access and bridging to different but relevant resources and synergies needed by the firm. The independent directors who are specially selected would mainly come from group of qualified individuals and professionals. Some are assumed to have acquired many years of auditing experiences, bringing along with them qualities of greater credibility and attestation (Robertson & Davis, 1985), and hopefully will improve quality of reporting and minimize potential risk (Messier et al., 2007). On top of that, is the motivational factor, derived from the normative auditing theory, (Robertson and Davis, 1985), which provides guidelines on the characteristic of the monitoring or auditing agents allowing for the possibility of achieving a normative result, thus giving an indication of what a good practice would have been liked. In this respect, the auditing theory will provide guideline as to the standards of the professional skill, and the level of independence, that will require directors to be objective and professional in the discharging of their duty.

### *1.2 Problem Statement*

In an attempt to introduce independent directors at the board room and at the board committee, the representation of independent directors has not been uniformly specified. Indeed companies at the early stage may have viewed the engagement of independent directors with little or no favor at all, contemplating that it may have brought about extra costs instead of financial benefits. A favorable or propitious view towards independent directors is certainly missing. This may have caused to find no standard number of outside or independent directors employed by companies in many parts of the world. The composition of independent directors that is adopted by

one country for each firm is not similar to another one adopted in another country. At the early stage of prompting independent directors in the organization of each country, and for the purpose of implementing the code of corporate governance, multitude of heterogeneity in the number of independent directors is traced. There is no common yardstick as to the number of independent directors who would serve as monitoring and auditing agents at the board room and well as at the committee level. Each country will set the limit on the number of independent directors which may sit at the board for each firm. While a minimum of one third of independent directors of the total board composition is established, others will require at least fifty percent which are made up of independent directors. There are also some which also accept a smaller representation of its independent directors at the board room. In the United States and Australia, a minimum requirement of 50 percent of independent or outside directors is established in the board room, thus making it possible to take advantage of its simple majority position to exercise the mandate vested in them. Other parts of the world, like India for instance, a 50 percent minimum requirement is used when the chairman is an executive; while in South Korea and United Kingdom, a composition of 50 percent is effectively used for big firms or conglomerate of firms. However, a more radical approach from countries like Germany and Japan is found, where the role of board of directors in corporate governance practice takes a different platform. Japan allows for a minimum of one independent director provided that the firm is adopting a US-based three committee structure, with at least two outside directors are required. In West Germany, it encourages a dual board structure, to ensure that a check and balance at the strategic level is effectively exercised.

Globally, three approaches are widely used in the application of corporate governance practices. First, the prescriptive method, which allows companies to follow corporate governance code strictly, second, the non-prescriptive method, that will require companies to be more flexible in disclosing their actual practices and, finally, the hybrid method, permitting companies to vary the exercising of the corporate governance code according to the current circumstances under which the firm operates. Against the background of this corporate governance framework, Malaysian authorities without doubt have implemented the hybrid method. Public Limited Company (PLC) in Malaysia is encouraged to apply on a voluntary basis the principles of the Code of Corporate Governance and to explain any variation that may have deviated from the Code of Corporate Governance best practices. In this way, the hybrid method which adopts a representation-based approach paves the way for independent directors to play a more proactive role over the management of the organization. Certainly, the listing requirement in Malaysia has made it near to mandatory, that the independent directors should be well represented at board level among all listed firms in Malaysia. While some firms in Malaysia are obliged to set at either one third or minimum of two numbers, whichever is lower, others are more willing to increase the representation of the independent directors at the board room. The audit, nomination and remuneration committees are also established making up mainly of independent directors. The listing requirement certainly encourages that the audit committee which comprises an estimate of three directors, proposes that the majority of the composition would come from independent directors. The committee at both the remuneration and nomination level is expected to be mainly composed of the independent directors. Indeed, the stimulating factor to carry out this research is certainly an attempt towards evaluating and reviewing the influence of independent directors' adoption among firms in Malaysia from 2001 to 2009 both at board room and at committee level. It is certainly a test of rewarding a progressively propitious acceptance of independent directors. During this period of investigation, it will be observed that there is serious beginning on the establishment of code of corporate governance, which will highlight the significant role of independent directors. Focus is made on the role of independent directors in all the three committees. It is not surprising that that there is propitious adoption of independent directors over the years. The firm will not stop at just the deployment of independent directors. Certainly independent directors would be expected to contribute further, such as to orientate the company towards profit generation. Independent directors are anticipated to originate from pool of talented individuals and professionals, accountants and auditors. Together they will bring along with them wealth of experiences in both public and private practices. The skill and craft to spot both the strength and weakness are required from them, thus, in effect will gear the companies towards better performance through profit orientation and generation. This research is indeed providing great motivation to investigate more on the role of independent directors, which may culminate in increased value on firms' performance from their expertise, professionalism and experiences. The research feels that the role of independent directors would still not be effective if their presence cannot be felt and enforced at the board room. The companies should built trust and confidence on the abilities of independent directors. The firms are encouraged to accept, favor and propitiate deployment of independent directors and translate their engagement by increasing their representation both at the board room and at the committee level. In effect it is hoped that their contribution to the organization can be more effective.

In the light of the above issues, the primary objective of the study is to determine if the engagement of independent at the board committee is being viewed upon with more favor and propitiation by Malaysian firms. The broad objective would path the way to find more micro contributions from the independent directors' role. The research is further conducted with some specific objectives, which are identified as follows:

(i) To assess if propitious acceptance of independent directors tasking as nomination, remuneration and audit committee bring about profit generation; and,

(ii) To evaluate if increased representation of independent directors at the board and committee level is favored that would orientate the company towards profit generation.

## 2. Literature Review

Independent or outside directors' engagement in the areas of corporate governance has claimed increased attention among researchers and academic peers. It has somehow stimulated many interested parties to conduct a more in depth study of similar research, most saliently on the role and contribution of the independent directors to firms.

The listing requirement in Kuala Lumpur Stock Exchange (KLSE) has stipulated in Part A, 1.01, that a person is regarded as being qualified to become an independent director, when the candidate is not bound by any business or any form of relationship which may affect or interfere with the execution of the person's independent judgment. An ability to act in the best interest of the independent directors may be affected, if the status of that "independence" is being disputed. This widely accepted role of independent director is specifically and commonly defined as; In the United States, the National Association of Corporate Directors Blue Ribbon Commission, 1996 sees that independent directors have no relationship to the corporation; In France, the Vienot Report II, 1994 regards independent directors as free of corporation's management so that it will not jeopardize the person judgment; In United Kingdom, the Combined Code 1998 portrays independent directors as independent in character and judgment; In Canada, the Dey Report, 1994 defines independence as a free from any interest and any business or other relationship and in Australia, the Bosch Report, 1995 only assures independence when the director is not a substantial shareholder of the company and holds no executive capacity (Malaysian Institute of Corporate Governance-MICG, 2003).

Studies in the past have presented mixed findings. Independent directors are seen to have contributed to organization either directly or indirectly, filling in the gap precipitated from agency problem, as a result of conflict of interest between managers and shareholders and the principal-principal agency theory, culminating from rivalry of motivation between the dominant and the minority shareholders. The independent directors who are called upon to assume monitoring responsibility show that their action in the pasts reported mixed repercussion on firms' performance. Studies in the Unites States by Bhagat and Black, 2002 find that there is lack of correlation between board independent and corporate capitalization. Hermalin and Weisbach (2003), De Andres, Azofra, and Lopez (2005), Jackling and Johl (2009), and Giovannini (2010) report inconsistent evidence of the influence of independent or outside directors on firm value. However, research conducted by Choi, Park, and Yoo (2007) on Korean firms and Dahya and McConnell (2007) on UK firms, portray encouraging results, that independent directors involvement bring about improved market capitalization. Outside Directors can improve board effectiveness and firm performance (Weisbach, 1988; McKnight & Mira, 2003; Anderson & Reeb, 2004). In an empirical cross sectional study of 12 Chinese banks from 2003-2006, it is found that outside directors has brought about encouraging impact on bank performance (Bai & Nam, 2009). It is indeed cannot be denied that contribution from independent directors shows mixed results. The evidence is traced back to past research from different countries in many parts of the world as to the deployment of independent directors at the board room. Some companies like India and United Kingdom, recognize the value of increasing dominance of independent directors, and some countries may progressively raise the representation of independent directors at board room and committee, a sign of accepting independent directors propitiously. Others may still adopt a passive approach, and without resorting to any significant change in the representation of independent directors at the firm's board room.

### *2.1 Board of Directors*

Board of directors is sometimes called the board members. It is regarded as the highest decision making body and decision of the board that is adjudicated and passed will be the final decision. Members of the board would normally comprise the executive or non-executive chairman, the chief executive director and the rest of the directors. The board may be further sub-divided into the executive directors, who are appointed on full time basis

and the other are the non-executive independent directors, whose audience can only be felt when they come for board meeting. The listing requirement in Malaysia requires that at least two or one third of the total board members should make up of independent directors, and at least one of them, will be regarded as competent and qualified. The listing requirement may also require the disclosure of the senior independent director/directors and the exact role of the chief executive officer (CEO) and the chairman, as the executive chairman may simultaneously hold the post of a CEO. Independent directors will be required to serve in all the committee namely, the audit, nomination and remuneration committee, or in any of the above committee, as stipulated in paragraph 15.10 of the Kuala Lumpur Listing Requirement (MICG, 2003).

*2.2 Audit Committee*

The Malaysian code of corporate governance clearly stipulates that the audit committees should be consisting of a minimum of three directors, recommending that the independent should form the main bulk of the composition. The objective of the audit committee is to cultivate a strong business culture which will highlight the need to uphold a sound system of internal control in order to protect shareholders' investment and the company's assets. An audit committee is expected to be effective in strengthening the position of internal and external auditors in pursuance to the continuous upgrading of the standards of financial reporting and auditing. With sound internal control and transparent reporting, company will be able to manage its firms' financial structure properly in order to strengthen its financial position. Consistent with this drive, findings from Ravina and Sapienza (2010) and Cook, Barbara, and Wang (2011) report that independent directors who are members of audit committee helps to improve firm's performance. To ensure that the process of auditing is exercised responsibly by the audit committee, the latter is expected to be impartial and objective, while discharging its duty competently. Given this, the listing requirement strongly calls for majority of the audit committee to have possessed accounting or finance qualification. It is highly recommended that at least one must be a member of the Malaysian Institute of Accountants or has 3 years' working experience and is a member of any professional accounting association or body.

*2.3 Nomination Committee*

The nomination committee is provided under the Malaysian code of corporate governance, stipulated in Part 2 AA VIII. It is strongly recommended that the nomination committee should be made up wholly of independent directors. Even though there is a provision under section 128 of the Companies Act 1965, which governs the appointment and dismissal of directors of a public company by ordinary resolution, appointment of independent directors in the nomination committee to reinforce the function is certainly significant. The function of nomination committee is to nominate and re-nominate directors based on their contribution and performance and also to gauge the integrity of the status of independence of the company's independent directors. Any effort to allow the CEO to sit in the nomination committee should be discouraged so that the CEO will not be able to interfere with any of the independent directors' activities. Fich and White (2005) opine that the CEO who is a member the nomination committee has the likelihood of protecting his or her private interest. Consequently it will hamper the objective of advancing the interest of the company's shareholders.

*2.4 Remuneration Committee*

Independent directors in remuneration committee serve to determine the level of compensation or remuneration that is due to executive directors of the company. The remuneration will normally be gauged by linking rewards to performance of executive directors. The Malaysian code of corporate governance recommends that the remuneration committee should be wholly or mainly comprise non-executive directors. Independent directors sitting in the committee should be free from any interference or any prejudicial influence surfacing from the senior management or shareholder. From a study by Cook et al., 2011, independent directors sitting in the audit and compensation committee enhance trading performance on sales.

Highlighting the significance of the underlying theory contributed by the Agency Theory, the Normative Auditing Theory and the Resource Dependent Theory, the conceptual framework is developed to investigate further the positive role the independent directors could render, both at the board room and committee, to promote check and control or growth and subsequently gearing companies towards profit generation.

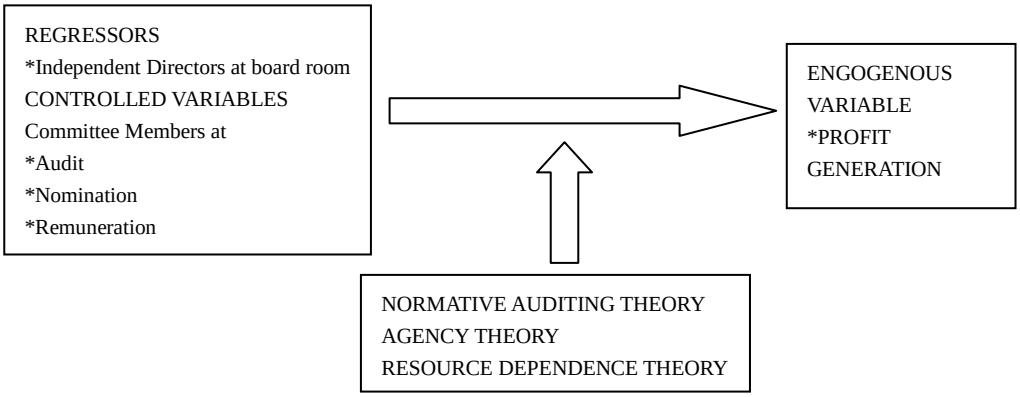


Figure 1. Conceptual framework

*2.5 Development of Research Hypothesis*

Independent directors are appointed for the purpose of monitoring strategic activities and to provide check and balance at the board room and board committee level. In this way the organization could cultivate an improved system of internal control. It has been argued that to be effective the effort of independent directors should be clearly felt. With increase representation and being accepted favorably, independent directors will be expected to be more effective to carry their weight to move the company towards profit generation.

Thus, the first hypothesis is developed;

**H1:** There is strong relationship between Independent directors who are propitiously accepted at the board room and committee level towards profit generation**.**

The independent directors would be required to serve at the audit, remuneration and nomination committee. The code of corporate governance 2001 (revised 2007 and 2012) recommend that the audit committee should consist of three directors of which two of them will make up of independent directors, whilst it is strongly recommended that the remuneration and nomination committee should be mainly composed of the independent directors. In a nutshell, the firm is encouraged to view the role and responsibility of the independent directors more favorable and propitiously at both board room and committee level, if the firm eventual purpose is to generate profits.

In the light of the above, three more hypotheses are developed.

**H2**: Independent directors who are members of the nomination committee are viewed preferably to move the firms toward profit generation.

**H3:** Independent directors in the remuneration committee are favorably associated to steer the firms towards profit generation.

**H4:** Independent directors who are also members of the audit committee would drive the firm towards profit generation.

**3. Research Methodology**

A panel data from 381 Malaysian listed companies was used. It is consisting of an estimated thirty percent of the total companies listed in Kuala Lumpur Stock Exchange, involving different types of industries of the main board from period 2001 to 2009. Data were extracted from as early as 2000, but the samples were subsequently finalized by deleting companies that have merged or being acquired; some companies failed to meet continuous listing requirement or suspended, while some firms suffered from wide fluctuation of the profit and loss value.

The research has been critically written to find the effect of propitious acceptance of independent directors. In this case, the propitious acceptance will be interpreted as the increase in favor to accommodate independent directors by giving them a more prominent role and an increased representation in board room and board committee. Statistically, when the data is collected from 2001 to 2009, there has been a strong evidence of increase representation of these independent directors.

The linear panel equation, with *lroai*t is formulated as a function of $\alpha + \beta_1 indbdit + \beta_2 aubdit + \beta_3 nobdit + \beta_4 rmbdit + \varepsilon it,$ Where, *lroai*t is return on assets for generation of profit. The *lroa* is measured by natural log of profit after tax of the firm's total assets. *Indbdit*, which stands for independent director is a percentage of the independent directors in the board room. A*ubdit*, which is a percentage of independent directors in the audit

board form the basis for audit committee. The same principle applies to nomination and remuneration committee which is measured by percentage of independent directors in the respective nomination and remuneration committee. Thus, *β3nobdit* stands for nomination committee, *rmbdit*, is for remuneration committee and, finally, $\varepsilon_{it}$ is the stochastic error term.

The three advanced panel method of analysis used to analyze the data are; First, the constant Co-efficient model or the Ordinary Least Square (Pooled OLS) Model, where *lroai*t is a function of $\alpha + \beta_1 indbdit + \beta_2 aubdit + \beta_3 nobdit + \beta_4 rmbdit + \varepsilon it$.

Second, the Random Effect (RE) Model, where *lroai*t is a function of $\alpha + \beta 1 indbdit + \beta 2 aubdit + \beta 3 nobdit + \beta 4 rmbdit + \lambda i + Uit,$ when $\varepsilon it$ is decomposed into $\lambda i$ (firm specific effect that has been excluded from the model and *Uit (*the remaining unexplained disturbance); and finally, is the Fixed Effect (FE) Model, where *lroai*t is a function of $(\alpha + \lambda i) + \beta 1 indbdit + \beta 2 aubdit + \beta 3 nobdit + \beta 4 rmbdit + Uit.$

$$(LM)\ Test,\ LM = \frac{NT}{2(T-1)}\left[\frac{\sum_{i=1}^{N}\left[\sum_{t=1}^{T}\hat{\varepsilon}_{it}\right]^2}{\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{\varepsilon}_{it}^2}(-1)\right]^2$$

The final model from the three options was carried out by first, the Breusch and Pagan Lagrangian Multiplier Which has helped to discriminate between a random effect and a Pooled OLS regression. The null hypothesis in the LM test is that variance of the error term is zero, $H_0$: $\sigma^2_\lambda = 0$ where the alternative hypothesis is $H_1$: $\sigma^2_\lambda \neq 0$. The LM is distributed as chi-squared with one degree of freedom under the null hypothesis. A higher chi$^2$ than the critical value or p value < the critical value at 95 percent confidence level, would mean, failing to accept the Ho, indicating that the variance of the error term is not constant. In effect the Constant Co-efficient model is not efficient, thereby the RE model is preferred over the OLS pooled model.

Another test, is the Hausman test, $Haus = \left(\hat{\beta}_{fe} - \hat{\beta}_{re}\right)' \left[\nu_{fe} - \nu_{re}\right]^{-1} \left(\hat{\beta}_{fe} - \hat{\beta}_{re}\right)$ is to distinguish the model choice between RE or FE. Denoting the variance-covariance matrix of $\beta_{fe}$ and $\beta_{re}$ by $V_{fe}$ and $V_{re}$, respectively, and letting k, as the degree of freedom to be the dimension of $\beta$, the Hausman statistic was formulated as above. The test is to determine if the country specific effects are correlated or uncorrelated with the regressors. The null hypothesis is $H_0$: Cov $(\lambda_i, x_{it}) = 0$, where the alternative $H_1$: Cov $(\lambda_i, x_{it}) \neq 0$. If the country-specific effects are uncorrelated with the regressors, the random effect estimator will deliver a consistent estimator that is efficient, in contrast to the fixed model which is unbiased under both the null and alternative scenarios.

Despite the robustness of panel data to common diagnostic problem, the threats of cross sectional and time series effect from the presence of multicollinearity, heterocedasticity and serial correlation would be tested. The data is looking for non-multicollinearity, *Cov (x1, x2) = 0*, presence of homocedasticity, $Var(\varepsilon i) = \sigma^2$ and is serially independent, $Cor(\varepsilon i, \varepsilon j) = 0,$ to ensure validity of data set. Both time and firm specific effect variance are also tested. A final model of white standard error is used after eliminating the insignificant value of the firm effect dummy variables. The while standard error employs variance-covariance matrix (VCE) instrument which specifies the standard error which is robust to some kinds of misspecification, that allows for intra group correlation.

## 4. Findings and Discussion

Table 1. The summary of the regressors and dependent variable from panel data

| Regressor | Pooled OLS | Random Effect | Fixed Effect | Standard error robust cluster (code) | Time & Fixed effect white standard error |
|---|---|---|---|---|---|
| *Constant* | 1.830 (17.28)*** | 1.4232 (14.01)*** | 1.3845 (14.11)*** | 1.8130 (0.1597)*** | 1.8658 (0.1122)*** |
| *Indbd* | 0.7124 (3.76)*** | 0.1959 (0.95) | 0.5505 (2.41)** | 0.7123 (0.3161)** | 0.7236 (0.1943)*** |
| *Aubd* | 0.2633 (1.79)* | 0.0131 (0.10) | 0.0815 (0.60) | 0.2633 (0.2357) | 0.1509 (0.1540) |
| *Nobd* | 0.1641 (1.85)* | 0.0422 (0.39) | 0.0067 (0.05) | 0.1641 (0.1422) | 0.1675 (0.0841)** |
| *Rmbd* | 0.5244 (5.27)*** | 0.1682 (1.39) | 0.0179 (0.13) | 0.5244 (0.1718)*** | 0.5342 (0.0973)*** |
| Breusch and Pagan Lagrangian Multiplier (LM) | 2305 (0.0000)*** | | | | |
| Hausman | | 29.47 (0.0000)*** | | | |
| *tdum7* | | | | | 0.1476 (0.0608)** |
| *Tdum8* | | | | | 0.1998 (0.0609)*** |
| Heterocedasticity | | | 5032 (0.0000)*** | | |
| Serial Correlation | | | 56.28 (0.0000)*** | | |
| Time variance | | | | | 8.86 (0.000)*** |
| Firm specific variance | | | | | 5.82 (0.0000)*** |
| Multicollinearity-vif | | | | | 1.86 |
| Observation | 2759 | 2759 | 2759 | 2757 | 2757 |

*Notes.* Figures in the parentheses are t-statistics, except for Breusch-Pagan LM test, Hausman test, Heterocedasticity and Serial Correlation and Robust Cluster code and White Standard Error, which are standard error values. ** and *** indicate the respective 5% and 1% significance levels.

The process of selecting the appropriate model, the three panel instrument, Constant Co-efficient model, the RE model and the FE model was carried out. Discriminating between the Pooled OLS and RE models, Breusch and Pagan LM test in Table 1 reported a high chi square value of 2305 or p = 0.000 < 0.05. It has significantly failed to accept the null hypothesis that $H_0$: $\sigma^2_\lambda = 0$ suggesting that, the variance of error terms is not constant, thus rejecting Pooled OLS model. A Hausman test in Table 1 (chi square of 29.47 or p=0.0000 < 0.05) has also failed to accept the null hypothesis that $H_0$: $Cov\ (\lambda_i, x_{it} = 0)$, suggesting serial correlation problem does exist between firm specific effect and the regressor, thus rejecting the RE model. In summary, both Pooled OLS and RE models are both found to be inefficient and inappropriate.

Selecting the FE model is not the answer to the final instrument to be adopted, as it has problem of heterocedasticity (F = 5032, p = 0.0000 < 0.1) and serial correlation (F = 56.28, p = 0.0000 < 0.01). Further tests revealed that there is a presence of both the firm's time and specific effect. The Standard Error Robust Cluster (code) does address the serial correlation and heterocedasticity but not the Fixed Effect due to time and firm variant. With the variance inflation factor *(vif)* value of 1.86, which is much below the critical value of 5.0, multicollinearity does not pose any threat. Given the dummy variable instrument for time effect, and eliminating the rest of the insignificant time effect dummy variables, and allowing for the retention of dummy lagged year 7 (tdum7) and year 8 (tdum8), a final model of white standard error is used. The model is regarded to be more

robust to some kinds of misspecification while permitting for intra group correlation.

Regressing, all the exogenous variables against the endogenous variable find that a propitious acceptance of independent directors is associated strongly with the company's ability to generate profit. The white standard error gives a strong t-statistic of 3.72 or $p = 0.000 < 0.01$, with standard error value of 0.1943, concurring with H1, that independent directors who are propitiously accepted at the board room and committee would significantly steer the company towards profit generation. Consistent with the pragmatic approach taken at the board room where the highest decision making is made pertinent to company's policy and strategy, it will involve greater participation of independent directors. Likewise there is also a significant impact on profit generation when independent directors' involvement is favored at the nomination committee. This is found to be significant with t-statistic at 1.99 or $p = 0.046 < 0.05$, at standard error equals 0.0841, supporting H2 that, independent directors who are members of the nomination committee are viewed preferably to move the firms toward profit generation. The Malaysian code of corporate governance, as stated clearly in Part 2 AA VIII, strongly recommends the nomination committee should be made up wholly of independent directors. This is to complement section 128 of the Companies Act 1965, which will specifically govern the appointment and dismissal of directors of a public owned company by simple or ordinary resolution. Getting the serious involvement of independent directors in nominating, appointing and reappointing directors would ensure that the appointment is not taken lightly. Directors know that their performance will be monitored and evaluated. Independent directors may also use their wealth of experience to nominate directors who have the potential to possess good business acumen that would translate directors' responsibility into revenue and profit generation.

Regressing remuneration committee against profit, finds significant t-statistic of 5.49 or $p = 0.000 < 0.01$, with standard error equals 0.0973 for remuneration committee, thus extending leverage to H3 that independent directors in the remuneration committee are favorably associated, to steer the firms towards profit generation. Independent directors' role in remuneration committee is to evaluate the level of compensations or rewards that is accrued to executive directors of the company. Theoretically and practically rewards to executive directors would be directly linked to their level of performance. In this respect, independent directors will provide an impartial and objective decision as to the rewards accrued to executive directors. The latter, knowing that their compensation will be evaluated on the basis of their performance will certainly not sit on its laurel but continue to find constructive and positive ways to generate company's revenue and profit. Indeed this is consistent with the findings in research by Cook et al. 2011, where independent directors sitting in the compensation committee enhance trading performance on sales.

Finally regressing independent directors as audit committee find no significant impact on profit with t-statistic at 0.98 or $p = 0.327 > 0.05$, 0.1 confidence level, with standard error equals 0.1540. It thus fails to accept H4 that independent directors who are also members of the audit committee would drive the firm towards profit generation. As an audit committee, the independent directors will perform the monitoring activities to ensure that compliance in policy implementation is carried out at the upper level. Like the internal and external auditors, there is no evidence of revenue generation that can be contributed by the audit committee. This is perhaps due to the fact that the company may require the audit committee to focus its responsibility more on meeting compliance rather than anything else.

## 5. Conclusion

Highlighting the needs to appoint independent directors in preserving good corporate governance has been the leading issue for discussion among researchers, academic peers and policy makers. Striking a balance between policy compliance and firms' performance has been hotly pursued. While the company takes serious view of policy compliance and transparent reporting, organization performance is equally important. Independent directors undertake complementary auditing role in the audit committee with the primary purpose to pursue compliance in reporting and policy's implementation. There is no evidence that it will lead to firm's performance. Independent directors who serve in the nomination committee will be given the opportunity to recommend to the board the candidate who may possess the business and entrepreneurial acumen to be the directors of the company, and translate the potential to generate income. On another note, directors whose performance is evaluated by independent directors at the remuneration committee would respond to a call that they no longer be given a free ride. The time has come that will push them to achieve company's performance through income generation. This research is conducted with the company's overview towards independent directors over the years, and there is some striking evidence that independent directors are being accepted more favorably. By being accepted more propitiously both at the committee and at the board, independent directors' engagement in the company has contributed to firms' income generation.

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# The Effects of Short-Term Capital Flows on Exchange Rates in Intermediate and Flexible Exchange Rate Regimes: Empirical Evidence from Turkey

Bahar Erdal[1] & Abuzer Pınar[2]

[1] The Central Bank of Turkey, Ankara, Türkiye

[2] Faculty of Economics and Administrative Sciences, Harran University, Şanlıurfa, Türkiye

Correspondence: Dr. Bahar Erdal, The Central Bank of Turkey, İstiklal Cad. No: 10, 06100 Ulus-Ankara, Türkiye. Tel: 90-312-507-55-15. E-mail: bahar.erdal@tcmb.gov.tr

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**Abstract**

The aim of this paper is to analyze empirically the effects of short-term capital flows on exchange rates in Turkey under intermediate and flexible exchange rate regimes. In this framework, the periods where intermediate (January 1994-February 2001) and flexible (March 2001-September 2012) exchange rate regimes implemented in Turkey were taken as a base. The estimation results show that foreign exchange rate regimes are significant factors for the effects of short-term capital flows on exchange rates. While the short-term capital flows have significant effects on exchange rates in the flexible exchange rate regime, they have no significant effects on exchange rates in the intermediate exchange rate regimes. In the intermediate exchange rate regimes, price differentials have significant effects on exchange rates. These empirical results are consistent with the theory.

**Keywords:** short-term capital flows, exchange rate, intermediate exchange rate regime, flexible exchange rate regime

## 1. Introduction

Economic theory suggests that capital will move from countries where it is abundant to countries where it is scarce because the returns on new investment opportunities are higher where the capital is limited. The reallocation of capital will increase investment in the recipient country and will bring enormous economic and social benefits. In this framework, starting from the 1990s, after the liberalization of capital movements, private capital flows to emerging market economies increased (Lopez-Mejia, 1999). However, capital inflows have the potential to increase volatility of monetary variables which can be used as intermediate or final target of the monetary policy such as monetary aggregates, inflation, exchange rate and foreign exchange reserves (Hoggarth & Sterne, 1997). Capital inflows may also reduce the usage of interest rates as a monetary policy instrument to achieve monetary policy targets. Besides, Hammond and Rummell (2005) states that in many of the emerging market economies, instead of economic growth and trade deficit, the magnitude and gyrations of capital flows were becoming the primary determinants of exchange rate movements in the short-term.

This study investigates the effects of short-term capital flows on exchange rates under different exchange rate regimes. The exchange rate regimes play an important role in providing economies to take the maximum advantage of increasing openness and depth of international financial markets. In the fixed exchange rate regime, capital inflows leads to higher inflation rates if there is no sterilization. In the case of non-sterilization, the central bank purchases foreign currency in exchange for domestic currency. The appreciation of nominal exchange rate leads to decline in interest rate differential. But, with the expansion of monetary base inflationary pressures may also increase. In the flexible exchange rate regime, exchange rates are determined freely by demand and supply.The main advantages of the floating regimes are their invulnerability to currency crisis, their ability to absorb adverse shocks and pursue an independent monetary policy. It is assumed that exchange rates quickly adjust to changes in the volume of short-term capital flows, thus, short-term capital flows should have significant effects on exchange rates. On the contrary, since in the intermediate exchange rate regimes exchange rates do not

quickly react to changes in the volume of short-term capital flows, they should not have significant effects on exchange rates (Yağcı, 2001).

On the other hand, in the flexible exchange rate regime, exchange rate flexibility would raise exchange rate risk premium and by driving a wedge between interest rate differential, helping to dampen interest sensitive capital flows. Real exchange rate volatility is mostly explained by short-term movements in the capital flows Hammond and Rummell (2005). Besides, in the flexible exchange rate regime, large volume of capital flows lead to exchange rate appreciation, weakening the competitiveness of domestic currency in the international trade. As a result, foreign demand for domestic goods decreases and domestic demand for foreign goods increases, thereby current account deficit increases. Then, the expectation of exchange rate depreciation may cause sudden stop and reversal of capital inflows that may result in a financial crisis.

Some studies are devoted to the analysis of those issues. Combes, Kinda, and Plane (2011) investigates the effects of different forms of private capital flows on the real effective exchange rate using a sample of 42 developing countries for the period 1980 to 2006. They find that short-term capital flows, especially portfolio investment has the highest appreciation effect, seven times that of foreign direct investment (FDI) and bank loans and private transfers have the least effect. They propose that allowing more exchange rate flexiblity would dampen appreciation due to capital inflows and avoid a significant loss of competitiveness. Bakardzhieva, Naceur and Kamar (2010) examines the effects of different forms of capital flows and foreign exchange flows (i.e., remittances, aid & income) on the real exchange rate for 57 developing countries and six regions over the 1980-2007 period. They find that capital flows have significant effects on real exchange rate in all regions except Central and Eastern European Countries. When capital flows and foreign exchange flows are disaggregated, it is found that income, remittances, aid, portfolio investment and debt have appreciating effects on the real exchange rate. They also showed that FDI is the only type of capital flow that has no significant effects on the real exchange rate appreciation.

The empirical studies on the relationship between short-term capital flows and exchange rates in Turkey are few. Ersoy (2013) investigates the role of capital inflows and the exchange market pressure on the real exchange rate appreciation in Turkey for the period January 1992 to September 2007. He finds that while FDI and worker's remittances do not have a positive effect on real exchange rate appreciation, portfolio investment liabilities and banks' foreign currency liabilities cause real exchange rate appreciation. Ersoy (2013) suggests that more flexibility introduced by the flexible exchange rate regime may help to loss of competitiveness or dampen the appreciation of Turkish lira related with short-term capital inflows. Mete (2012) investigates the relationship between banks' foreign currency liabilities and exchange market pressure in Turkey for the period December 1991 to August 2008. He finds that banks' foreign currency liabilities induce selling pressure in the exchange market and a fear of floating. Karahan and Çolak (2011) explores the behavior of economic growth rates and exchange rates during financial capital movements in Turkey for the period January 1992 to December 2010. They find that capital inflows are the major cause of real exchange rate appreciation but sooner or later has to be reversed with the expectation of exchange rate depreciation. Finally, Erdal and Pınar (2014) shows that foreign exchange rate regime is significant factor in the validity of the purchasing power parity in Turkey. While the purchasing power parity is not valid in the intermediate exchange rate regimes, it is valid in the flexible exchange rate regime. However, none of these studies takes into consideration foreign exchange rate regimes when analyzing the effects of capital inflows on the exchange rates.

The rest of this study is organized as follows: In Section 2, the history of short-term capital flows in Turkey is explained. In Section 3, the foreign exchange rate regimes implemented in Turkey are discussed. In Section 4, theoretical framework of the study is explained. In Section 5, data and empirical result are presented. Section 6 concludes the paper.

## 2. History of Short-Term Capital Flows in Turkey

The capital account liberalization in Turkey was initiated in conjunction with the process of economic and financial reforms that started in 1980, and was fully completed in 1989. Before 1980s, the control of capital inflows was realized through foreign exchange controls. The evaluation of capital flow movements shows that in the first half of the 1980s, the magnitude of capital inflows was limited. However, starting from the second half of the 1980s, there has been a visible increase in the volume of capital inflows. At the beginning of the 1990s, the capital flows to Turkey increased as in other emerging market economies. The establishment of money and capital markets together with the liberalization of foreign trade and capital movements led to increase volume of capital inflows.

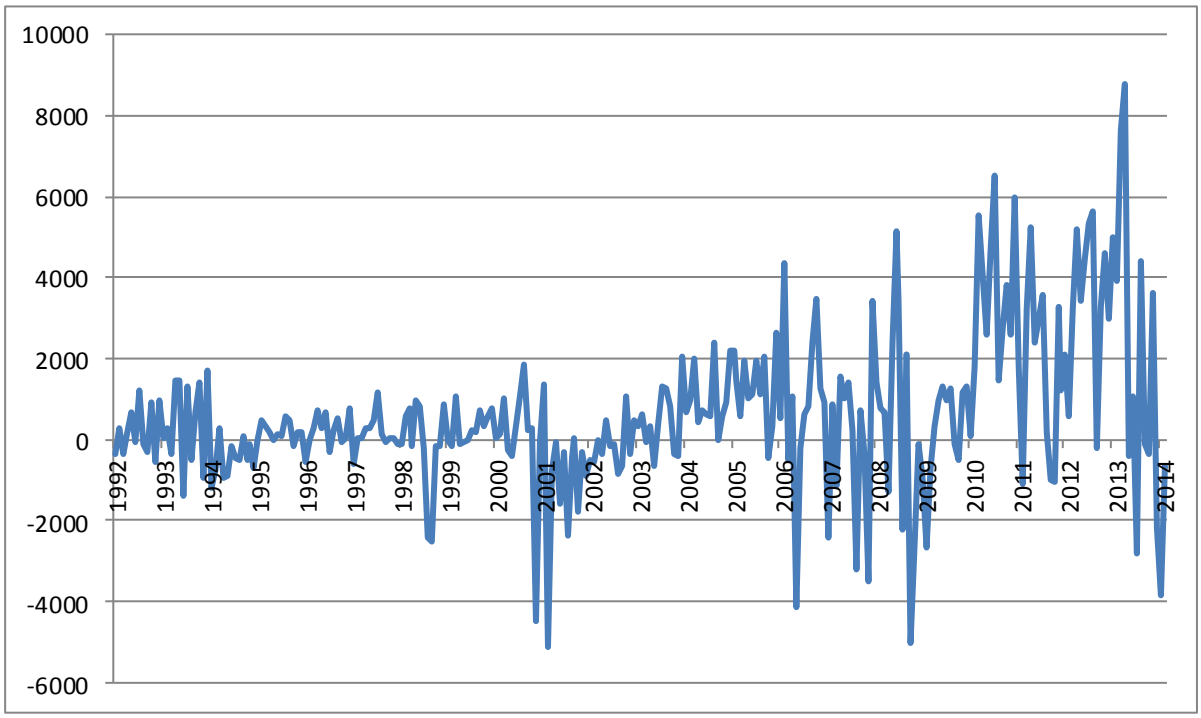


Figure 1. The volume of short-term capital inflows between 1992 and 2013 (monthly, million US $)

The capital inflows to Turkey after full capital account liberalization in 1989 were mainly short-term capital flows (Figure 1). These short-term capital flows constituted mostly credits obtained by banks (Figure 2). The short-term bank credits were the type of credit that responded immediately and in the highest magnitudes to the capital account liberalization during the 1990s. During this period, high budget deficits were financed by these short-term capital flows. Unlike the Asian countries, FDI did not constitute an important share of capital inflows. Portfolio investment was slow, and until 1992, it was mostly in the form of the Undersecretariat of Treasury's borrowing from abroad through bond issues. This outcome could be attributed to less-developed domestic financial markets. The establishment of domestic financial markets was conducted together with liberalization process. There was a change in the origin of the capital inflows after the liberalization. That means, while the public funds were constituted an important portion of the capital inflows before the 1980s, private capital inflows had an important share of the capital inflows during and after the 1980s.

From this point of view, the capital account liberalization process in Turkey started without establishing domestic financial markets and a strong financial system supervision and regulation. The establishment of financial markets and financial system supervision were conducted during the liberalization process. For that reason, it is possible to say that a financial environment that could promote foreign capital flows did not exist. On the other hand, the macroeconomic indicators were not so bright during the liberalization process. For instance, when the liberalization process was completed successfully in 1989, inflation rate was 38 percent and the ratio of public sector borrowing requirement to GNP was 5.3 percent. A high inflationary environment creates an uncertain environment for foreign investment; especially it may prevent foreign capital inflows. For that reason, it is possible to say that during this period, the government's financing requirement only encouraged short-term capital inflows through banks' credits.

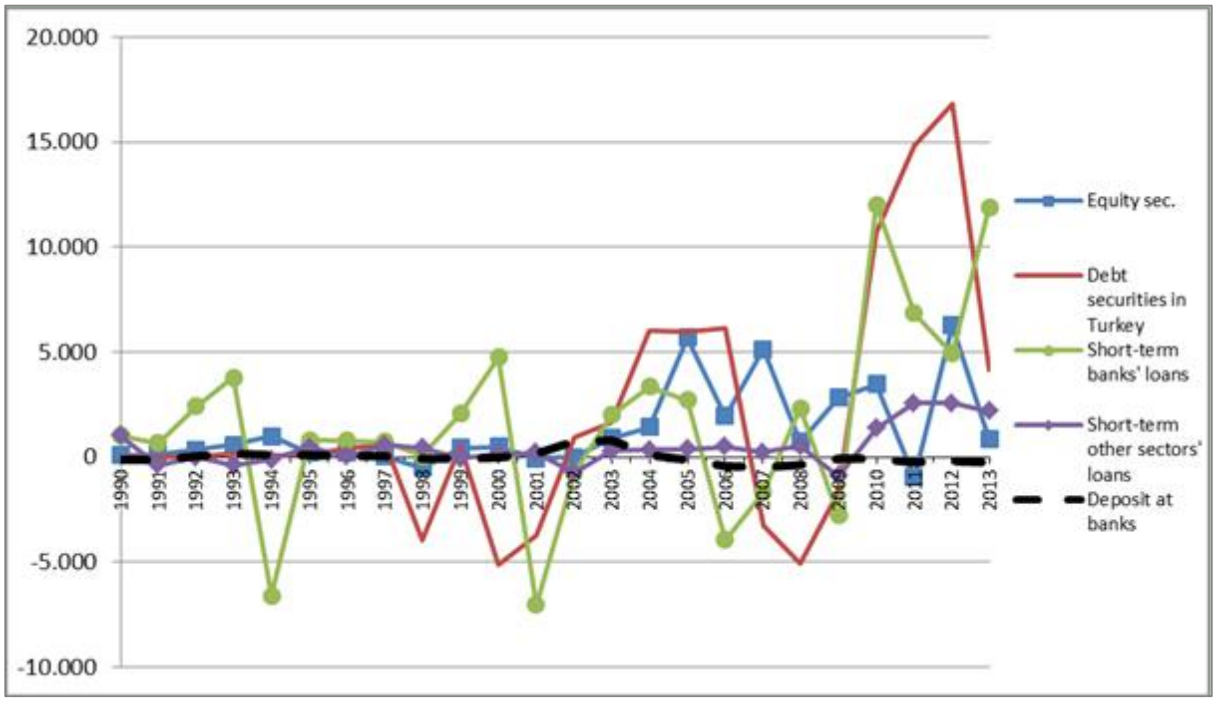


Figure 2. The components of short-term capital inflows between 1990-2013 (monthly million $)

After the financial crisis in February 2001, with the implementation of disinflation program the public sector borrowing requirement decreased, inflation rates and interest rates fell, economic growth rate increased and macroeconomic stability achieved. As a consequence, during 2004-2008 period the amount of FDI and long-term capital flows increased (Figure 3). However, the global crisis in 2009 and 2010 led to decrease of FDI and long-term capital flows, and so, short-term capital flows increased again.

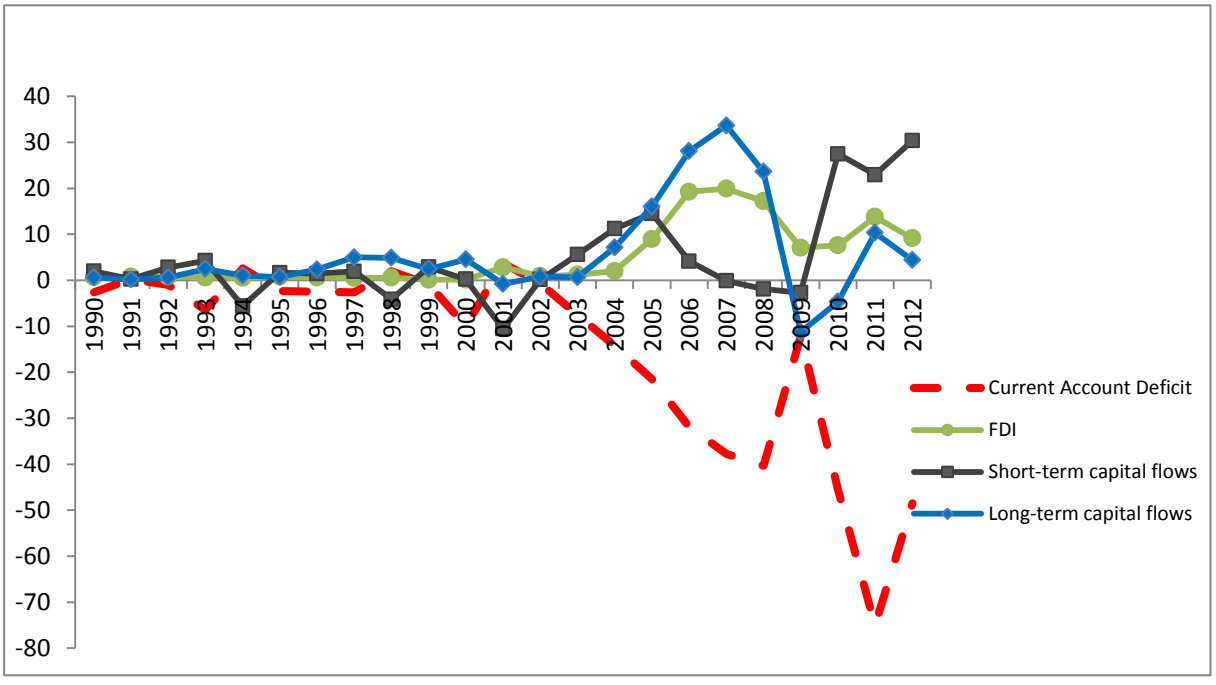


Figure 3. The current account deficit and capital flows between 1990-2012 (yearly, billion US $)

## 3. Foreign Exchange Rate Regimes in Turkey

The exchange rate regimes implemented in Turkey from 1923 to 2001 were described as fixed and managed floating exchange rate regimes (Reinhart & Rogoff, 2002; Bubula & Ö tker-Robe, 2002; Pınar &d Erdal, 2011). Beginning from 1990, de jure flexible exchange rate regime was implemented and the Central Bank Bank of Turkey often intervened the exchange rate volatility. For that reason, the exchange rate regime was called "managed floating". At the beginning of 1995, the value of the Turkish lira was pegged to the currency basket consisted of 1 US dollar and 1.5 Deutsche mark. It was also decided that the monthly value of the currency basket would be increased with respect to expected monthly inflation rates. The Central Bank of Turkey intervened in the foreign exchange market to maintain foreseen increase in the currency basket.

Between 1996 and 1999, the Central Bank of Turkey regulated the foreign exchange rate policy with respect to the monetary policy. In this period, since the primary objective of monetary policy was to maintain financial markets' stability, with the exchange rate policy the exchange rate volatility tried to be minimized. The Central Bank of Turkey intervened in the foreign exchange market in order to minimize exchange rate volatility. The devaluations were made with respect to expected inflation rates. So, the exchange rate regime implemented this period can be described as "managed floating with no predetermined path for the exchange rate".

In December 1999, a stand-by arrangement was signed with the International Monetary Fund (IMF) and within the framework of the disinflation program "forward looking crawling pegs" started to be implemented. The exchange rate increases were determined in accordance with the targeted inflation rate. The value of the exchange rate basket consisted of 1 US dollar and 0.77 euro was announced for one year. But, after the 22 February 2001 financial crisis, this regime was abandoned and flexible exchange rate regime was adopted. Currently, the Central Bank of Turkey intervenes in the foreign exchange market to minimize excessive exchange rate volatility and in the case of excess foreign exchange supply in the market buy them to increase its foreign exchange reserves.

## 4. Theoretical Model

In the theoretical part of study, the purchasing power parity (PPP) hypothesis is taken as a base. The PPP explains the relationship between exchange rates and national price levels. It represents an equilibrium relationship between the exchange rate (i.e., the cost of a unit of foreign currency in terms of domestic currency) and national price levels. The origins of the PPP hypothesis goes back to the Salamanca School in Spain in the $16^{th}$ century and to the works of Gerrard de Malynes in England at the Tudor period in 1601. In the $19^{th}$ century some classical economists, including Wheatley, Ricardo and Mill developed the PPP hypothesis. However, the Swedish economist Gustav Cassel became the first author to reexamine the PPP in the $20^{th}$ century. (Balassa, 1964; Holmes, 1967). He recognized that the PPP can be regarded as an extension of the quantity theory of money to an open economy. In the 1970s, the interest in the theory revived when the flexible exchange rate regime begun.

The basic concept of PPP is the law of one price that implies the price of identical goods is equalized between countries by perfect arbitrage assuming there are no transportation costs and no barriers to trade such as tariffs, custom duties, quotas etc. An alternative interpretation of the law of one price is mentioned in the Cassel's theory (Balassa, 1964; Holmes, 1967). The absolute PPP assumes that if different goods are produced and the law of one price holds for each of the goods, then the cost of a basket of goods and services should be the same in all countries when measured in terms of a common currency.

$$Nominal\ exchange\ rate\ (e_{nominal}) = P^{*} / P$$

The absolute PPP assumes that real exchange rates continuously equal to 1. The real exchange rate is the nominal exchange rate adjusted to the foreign and domestic price levels.

$$Real\ exchange\ rate\ (e_{real}) = e_{nominal}\, x\, P^{*} / P$$

The relative PPP states that the exchange rate changes should be equal to the differences between domestic and foreign inflation. So, the value of a currency tends to rise or fall at a rate equal to the difference between domestic and foreign inflation.

The empirical studies about the validity of the PPP show that while the absolute PPP is not valid in practice, the relative PPP is valid in the long-term and the exchange rates may deviate from the PPP in the short-term (Frenkel, 1981; Frenkel, 1978; Hakkio, 1992; Hakkio, 1984; Krugman, 1978). One of the major reasons for the deviations from the PPP is that the PPP only consists of international trade flows and does not take into account international capital flows (Seyidoğlu, 2003). This may not be a problem during the period when the PPP theory was developed since the volume of international capital movements were not very large. However, starting from

the 1990s the volume of international capital flows was more than the volume of foreign trade flows, so their exclusion from the PPP may lead to failure of the validity of the PPP. For that reason, in this paper the short-term capital flows are included in the estimation regressions to see the effects of them on the exchange rates under intermediate and flexible exchange rate regimes.

## 5. Data and Empirical Results

In the empirical part of the study, the effects of short-term capital flows on exchange rate are analyzed empirically for Turkey under intermediate (January 1994-February 2001) and flexible exchange rate regimes (March 2001-September 2012). To this aim, firstly, cointegration is tested for the nominal exchange rate, short-term capital flows and price differentials between Turkey and the United States. Secondly, the following equation is estimated for the intermediate and flexible exchange rate regimes:

$$LN(NER) = (LN(TRCPI) - LN(USCPI)) + LN(SHORT - TERM\ FLOWS)$$

Where NER is nominal exchange rate, i.e., the amount of Turkish lira per unit of US dollar, TRCPI is the Turkey's Consumer Price Index and USCPI is the United States of America's Consumer Price Index, SHORT-TERM FLOWS is the short-term capital-flows in Turkey. All the variables are in the logarithmic forms. Thirdly, the error correction mechanism (ECM) was tested.

The nominal exchange rate and consumer price indices are monthly and are obtained from the IMF International Financial Statistics (IFS), the short-term capital flows are monthly and are taken from the Balance of Payment Statistics of the Central Bank of Turkey. The short-term capital flows include the following items of the Balance of Payment Statistics: (B.2.2.1) Equity Securities, (B.2.2.2.2.1) Debt Securities, (B.3.2.2.4.2) Short-term Banks' Loans, (B.3.2.2.4.2) Short-term Other Sectors' Loans, (B.3.2.3.2) Deposits at Banks.

In Table 1, the cointegration test results for nominal exchange rate, short-term capital flows and price differentials in the intermediate and flexible exchange rate regimes are presented. The cointegration test results show that under the intermediate exchange rate regime, there is 1 cointegrating vector at the 0.05 level. Under the flexible exchange rate regime 3 cointegrating vectors at the 0.05 level.

Table 1. Cointegration test results

| Period | EigenValue | Trace Statistic | 0.05 Critical Value | Probability*** | n |
|---|---|---|---|---|---|
| **Intermediate exchange rate regime*** | | | | | |
| **None**** | 0.213941 | 31.37267 | 29.79707 | 0.0327 | 84 |
| **At most 1** | 0.123449 | 11.15192 | 15.49471 | 0.2023 | |
| **At most 2** | 0.001000 | 0.084083 | 3.841466 | 0.7718 | |
| **Flexible exchange rate regime****** | | | | | |
| **None**** | 0.175236 | 60.15713 | 29.79707 | 0.0000 | 139 |
| **At most 1** | 0.145657 | 33.37767 | 15.49471 | 0.0000 | |
| **At most 2** | 0.079377 | 11.49590 | 3.841466 | 0.0007 | |

(*) Trace test indicates 1 cointegrating vector at the 0.05 level.

(**) denotes rejection of null hypothesis at the 0.05 level.

(***) MacKinnon-Haug-Michelis (1999) p-values.

(****) Trace test indicates 3 cointegrating vectors at the 0.05 level.

As a second step, three period lags of the independent variables are included in the regression and they are estimated for intermediate and flexible exchange rate regimes. Then, the statistically insignificant variables are dropped from the regressions and the statistically significant ones are kept in the regressions and they are re-estimated. These estimation results are presented in Table 2 and Table 3 respectively. As can be seen from Table 2, in the intermediate exchange rate regime, price differentials and one and two quarter lags of the nominal exchange rate have significant effects on nominal exchange rates. The short-term capital flows have significant effects on nominal exchange rate after three quarters.

Table 2. Estimation results for intermediate exchange rate regime

$$LN(NER) = B_o + B_1(LN(TRCPI) - LN(USCPI)) + B_2LN(SHORT\text{-}TERM\ FLOWS) + u_t$$

| **Dependent variable: LNNER** | |
|---|---|
| LNSHORT-TERM FLOWS | -0.0233 |
| | (-1.153) |
| LNTLCPI - LNUSCPI | 1.4819** |
| | (5.772) |
| LNNER (-1) | 0.5739** |
| | (5.826) |
| LNSHORT-TERM FLOWS (-3) | -0.0949** |
| | (-2.924) |
| LNTLCPI - LNUSCPI (-1) | -1.2356** |
| | (-4.607) |
| LNNER (-2) | 0.1778** |
| | (1.728) |
| Number of observations: 84 | |
| R-squared: 0.99 | |
| Durbin-Watson statistic: 1.99 | |

*Note*. The values in the parenthesis are t statistics. ** denotes the coefficient is statistically significant at 5%.

In the flexible exchange rate regime (Table 3), short-term capital flows have statistically significant effects on nominal exchange rates. The price differentials do not have significant effects on nominal exchange rates and one quarter lag of the nominal exchange rate has significant effects on exchange rates.

Table 3. Estimation results for flexible exchange rate regime

$$LN(NER) = B_o + B_1(LN(TRCPI) - LN(USCPI)) + B_2LN(SHORT - TERM\ FLOWS) + u_t$$

| **Dependent variable: LNNER** | |
|---|---|
| LNSHORT-TERM FLOWS | -0.0438** |
| | (-4.459) |
| LNTLCPI - LNUSCPI | -0.0004 |
| | (-0.031) |
| LNNER (-1) | 0.909** |
| | (27.053) |
| LNSHORT-TERM FLOWS (-1) | 0.011 |
| | (1.282) |
| Number of observations: 139 | |
| R-squared: 0.87 | |
| Durbin-Watson statistic: 1.61 | |

*Note*. The values in the parenthesis are t statistics. ** denotes the coefficient is statistically significant at 5%.

Then, the error correction model (ECM) is estimated to find the speed at which dependent variable nominal exchange rate return to equilibrium after a change in the independent variables price differentials and short-term capital flows. The ECM is useful for estimating both short-term and long-term effects of explanatory variables. The ECM can be written as:

$$\Delta Yt = \beta 1 \Delta Xt - \pi u(t-1)$$

In this model, "Δ" shows the first difference of the variables, "β1" is the impact multiplier or short-run effect that measures the immediate impact that a change in Xt will have on change in Yt. The "π" is the feedback effect or adjustment effect, which shows how much of the disequilibrium is being corrected, in other words, the extent to which any disequilibrium in the previous period affects any adjustment.

Table 4. Error correction model results for intermediate and flexible exchange rate regimes

$$DLN(NER) = B_o + B_1D(LN(TRCPI) - LN(USCPI)) + B_2DLN(SHORT - TERM\ FLOWS) + u_t(-1)$$

| Dependent variable: LNNER | Intermediate Exchange Rate Regime | Flexible Exchange Rate Regime |
|---|---|---|
| DLNSHORT-TERM FLOWS | -0.035** | 0.013 |
| | (2.635) | (1.608) |
| DLNTLCPI - LNUSCPI | 1.179** | 0.423 |
| | (4.526) | (1.578) |
| $u_t(-1)$ | -0.322** | 0.136 |
| | (-2.7) | (1.585) |
| Number of observations: 84 | | |
| R-squared: 0.27 | | |
| Durbin-Watson statistic: 1.87 | | |

*Note.* The values in the parenthesis are t statistics. ** denotes the coefficient is statistically significant at 5%.

In the intermediate exchange rate regime (Table 4), the adjustment effect is -0.322 and statistically significant. This means, nominal exchange rate returns to equilibrium value after three months due to change in price differentials and short-term capital flows. On the other hand, in the flexible exchange rate regime, the adjustment effect is statistically insignificant that means there is no deviation from the equilibrium exchange rate due to continuous adjustment.

## 4. Conclusion

This paper analyzed empirically the effects of short-term capital flows on exchange rates in Turkey under intermediate and flexible exchange rate regimes. In the flexible exchange rate regime, since exchange rates quickly adjust to changes in the volume of short-term capital flows, short-term capital flows should have significant effects on exchange rates. On the other hand, since in the intermediate exchange rate regimes, exchange rates do not quickly react to changes in the volume of short-term capital flows, and hence they should not have significant effects on exchange rates.

In the theoretical part of the study, the PPP hypothesis is taken as a base. The PPP explains the relationship between exchange rates and national price levels. One of the major reasons for the validity of the PPP is that the PPP only consists of international trade flows and does not take into account international capital flows. This may not be a problem during the period when the PPP theory was developed since the volume of international capital movements were not very large. However, starting from the 1990s the volume of international capital flows became more than the volume of foreign trade flows, so their exclusion from the PPP may lead to failure of the validity of the PPP. For that reason, in this paper the short-term capital flows are included in the estimation regressions to see the effects of them on the exchange rates under intermediate and flexible exchange rate regimes.

The empirical findings show that foreign exchange rate regime is a significant factor for the effects of short-term capital flows on exchange rates. While the short-term capital flows have significant effects on exchange rates in the flexible exchange rate regime, they have no significant effect on exchange rates in the intermediate exchange rate regimes. Ersoy (2013) and Karahan and Çolak (2011) also found significant effects of short-term capital flows on exchange rates. In the intermediate exchange rate regimes, price differentials have significant effects on the exchange rates. Further research may be helpful to understand the impact of foreign trade deficit on the short-term capital flows, and hence on the exchange rates.

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**Note**

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# Positive Psychological Capital Development: A Field Study by the Solomon Four Group Design

Ö znur Gülen Ertosun[1], Oya Erdil[2], Nevin Deniz[3] & Lütfihak Alpkan[4]

[1] Vocational School of Social Sciences, Istanbul Medipol University, Istanbul, Turkey

[2] Faculty of Business Administration, Gebze Technical University, Kocaeli, Turkey

[3] Faculty of Business Administration, Marmara University, Istanbul, Turkey

[4] Faculty of Management, Istanbul Technical University, Istanbul, Turkey

Correspondence: Ö znur Gülen Ertosun, Vocational School of Social Sciences, Istanbul Medipol University, Istanbul, 34810, Turkey. Tel: 90-021-6681-5100. E-mail: ogertosun@medipol.edu.tr

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**Abstract**

Positive psychological capital has taken attention in the last decades considering today's work conditions and employee expectations in gaining competitive advantage. There is growing evidence that positive psychological capital has contribution on employees' desired outcomes and provides a new perspective for understanding and potentially managing negative and stressful organizational circumstances. Recent theory and research have also proposed that positive psychological capital as a state-like construct is open to development and change. The immediate goal of the study is to design and implement a short positive psychological capital training program by following Luthans et al. (in their series of studies in 2006, 2008, & 2010) course of action and control its effectiveness by the Solomon four group experimental design which is one of the most powerful research designs available and rarely used especially for training programs. A sample of 156 management students participated to the training program. The findings of the current research will contribute to human resources development literature as well as to Solomon experimental design application.

**Keywords:** hope, optimism, positive psychological capital, resilience, self efficacy, solomon four group experimental design, training

## 1. Introduction

Psychology used to concentrate more on mental illness rather than wellness until the recently increased attention towards 'positive psychology'. The positive turn is also fundamental for occupational health psychology (Schaufeli, 2004). Traditional individual and organizational interventions focus on momentary damage (operational training etc.) in contrast the positive psychology concentrates on principles of prevention, improvement and development as a new perspective (Seligman & Csikszentmihalyi, 2000). Additionally studies on the subject of training and development rarely targeted at the workplace (exp. Gist, Stevens, & Bavetta, 1991; Holdnak, Clemons, & Bushardt, 1990) and generally focus on long term applications (Kossek, Roberts, Fisher, & Demarr, 1998; Fresco, Moore, Walt, & Craighead, 2009) rather than micro interventions such as 2-hour implementations.

As an addition to the already existing human capital and social capital constructs, Luthans, F., Luthans, B., & Luthans, K. (2004) composed a construct to measure sustained competitive advantage within an individual which is labeled as 'Positive Psychological Capital (psycap)'. It consists of four components: Hope, optimism, self-efficacy and resilience. Relying on 'Positive Organization Behavior' (POB) movement, it measures positive psychological aspects of an individual and focuses on the strengths rather than the weaknesses (Luthans et al., 2004). Stajkovic (2006) has advanced the same four constructs and called as 'core confidence'.

Similar to the traditional (financial, structural/physical, technological), human (explicit and tacit knowledge), and social (networks, norms/values, and trust) capital, positive psychological capital also contains some basic components of being positive, unique, measurable, developable, and performance-related (Luthans & Youssef, 2004). Avolio and Luthans (2006) conceptualized positive capacities 'as a state-like construct that is more sTable than a mood or brief affection and less sTable than intelligence and personality' (Avey 2007, p. 8). State-like

properties can be developed (e.g. trained) over time, as opposed to trait-like constructs, has been supported with a series of studies (Luthans et al., 2006, 2008, & 2010).

In the light of the related literature, the purpose of this study is to perform a positive psychological capital intervention and test its effectiveness with the Solomon design which is the most powerful experimental design. Firstly literature about psycap is reviewed and theoretical background for the development process and training procedures for the study is explained. Then, methods for Solomon design are discussed and hypotheses are developed. The study proceeds with findings and conclusion sections.

## 2. Literature Review and Hypotheses Development

### *2.1 Positive Psychological Capital Development*

Luthans et al. defined positive psychological capital as "an individual's positive psychological state of development that is characterized by: (1) Having confidence (self efficacy) to take on and put in the necessary effort to succeed at challenging tasks; (2) Making a positive attribution (optimism) about succeeding now and in the future; (3) Persevering toward goals and, when necessary, redirecting paths to goals (hope) in order to succeed; and (4) When beset by problems and adversity, sustaining and bouncing back and even beyond (resilience) to attain success" (Luthans, Youssef, & Avolio, 2007b, p. 3).

Hope is considered as positive motivational state that is based on an interactively derived sense of successful agency and pathways (Snyder, 2000). Pathway refers to the method, strategy or ability to achieve goals and willpower (agency) means the motivation or beliefs to pursue goals and is the psychological energy of achieving objectives (Zhao & Hou, 2009). In the light of Snyder's hope theory Luthans et al. suggested goal design-pathway generation- overcoming obstacles implementations in order to increase hope capacity (Luthans, Avey, Avolıo, Norman, & Combs, 2006).

As a short description, optimists expect good things happen to them (Carver & Scheier, 2002) and explain positive events as internal (something about themselves), sTable (persists or recurs over time) and global (effects many situations) and also vice versa for negative events (Peterson et al., 1982; Oettingen, 1995). In Seligman's attribution framework this approach labeled as optimistic explanatory style (Nelson & Cooper, 2007). As a result, optimism can be considered a global positive expectation of success; Self efficacy is task or domain specific and the employee's confidence to his/ her abilities that is a specific positive expectation (Stajkovic & Luthans, 1998). According to Bandura (1997) self efficacy mobilizes the motivation and cognitive resources in order to take the necessary actions to complete the specific task (Qingshan & Xuansheng, 2014). And also he defines four mechanisms in order to improve self efficacy. These include task mastery, modeling (vicarious learning), social persuasion (positive feedback), and physiological/psychological arousal (Luthans et al., 2006). In this training program three of the four mechanisms (expect for psychological arousal) is used for self efficacy exercises.

Resilience is defined as "a class of phenomena characterized by good outcomes in spite of serious threats to adaptation or development" (Masten, 2001, p. 228). Resilience development process contains asset factors that increases individual and environmental benefits- and vice versa for risk factors and also contains influence process for both of them (Masten, 2001). Resilient people restrainedly accept facing with harsh realities. They attribute a meaning to terrible times. And they have an ability to adapt the conditions and content with what they have (Coutu, 2002).

Luthans et al. recently developed a short training version (psycap intervention-PCI) and published a series of empirical studies (2006, 2008, 2010, & 2012). Luthans el al. (2006) firstly initiated their training program to management students as experiment and control groups (the control group received decision making training), then to managers from different companies and sectors and then to a single firm. All findings indicate that PCI has developed the participants' psycap levels. Following PCI study of Luthans et al. (Luthans, Avey, & Patera, 2008) tested web-based training intervention and significant support has been found. Additionally in another study (Luthans, Avey, Avolio, & Peterson, 2010) in control group concentrate on ordering (that is developing mechanism of the capacities given in different orders to the participants) and found no significant difference. And for main study they tested PCI training's effect on their performance level. Participant and their managers rated their performance level and found that PCI increases their performance level in addition to their psycap. Using a pretest, posttest control group design, psycap has also been shown to be significantly related to business student academic performance (Luthans, Luthans, & Jensen, 2012).

### *2.2 Training Procedures for Positive Psychological Capital*

Following Luthans et al. guide and related literature a psycap development training program has been developed in this study. Theory building and development process about positive capacities is based on the work of

Masten's (2001) for resilience component, Snyder's (2000) hope, Bandura's (1997) self-efficacy theories and also expectancy-value orientation and realistic optimism. Based on the theories suggested developmental mechanisms are used to develop the capacities.

The training program begins with the introduction of positive capacities; how each capacity is applicable in the workplace. Positive emotions and positive psychological capital are defined. Additionally each capacities (hope-optimism-resilience-self efficacy) are explained in detail and also examples are given.

Then participants are asked to think about and write down their realistically challenging and personally valuable goals. The training program contains the discussion and examples of what are realistically challenging goals and how to determine if the goal is personally valuable (develop willpower capacity) then goals are divided to sub-goals (stepping) so their agency capacity increased. Achievable perception about sub-goals also increased their will power capacity. Accomplishment expectation increases both hope and also optimism capacities. Furthermore, participants are asked how they could achieve their goals and other participants encouraged to give suggestions. For a short time participants are asked to think about the obstacles. And then others contribute their ideas for each other. Trainer encourages them to define the obstacles and develop multiple pathways. Alternative solutions, risk plans for potential obstacles also develop their hope capacity.

Goal exercise is also effective for the 'self efficacy building' by the mediation of task mastery and social persuasion (etc. participants share their goals, determine pathways and advice to each other, and trainer encourage the interaction process). Besides in the training program some famous films, successful examples from political leaders and business world are examined in terms of their psycap capacity (modeling). Luthans implies that self efficacy and hope development exercises also increases the optimism level of participants. For example in the training section trainer frequently encourages participants to positive self talks. Moreover in this phase positive output definition and imagination of achieving goals increase positive expectancy and optimism.

Training continues for resilience development processes. Resilience development concentrates on participants' perception about emotional, cognitive and behavioral process. Self reflection exercises (from past to future) help to run personal SWOT analysis. Participants consider and express negative workplace experiences and share their reactions with others. Then trainer talks about ideal resilience process (such as realistic perception about the negative events and ideal reactions). "Impact-control-options" are examined for developing the right reactions. In control and out control situations are explained and examined in order to contribute learning process about problem solving and conflict management styles. This process developed both cognitive resiliency and realistic optimism. The development process ends up with the useful exercises to adapt the gains routine working days.

As explained above, most of development mechanisms help to improve more than one construct and this confirms that all four components (hope-optimism-resilience-self efficacy) reciprocally interact with each other and psycap means more than all of them.

*2.3 Theoretical Framework for Solomon four Group Design*

While one group design involves a pre-test/post-test without using a control group, two group designs use an experimental (training) and control group (without training) and two groups take a pre-test/post-test. About one hundred years ago control groups took place in behavioral sciences because it had been observed that pre-testing or assessment itself had effects on change over time to intervention and that assessment may interact with interventions to either strengthen or weaken observed effects. In these circumstances 2-group comparisons in trials may produce biased estimates of effects however advent of randomization to allocate participants to groups subsequently that is reactivity can't be solved by pre-testing in the two-group trial, Solomon thus proposed a 4-group (and in some cases a three group) "extension of control group design" in which a further randomization took place, allocating participants within both the experimental and control groups to be pre-tested or no (Solomon, 1949; McCambridge, Butor-Bhavsar, Witton, & Elbourne, 2011).

An experimental group receives a pre-test, training and then post-test, a control group receives a pre-test and a post-test separately another experimental group receives training and only a post-test, last control group only takes a post-test. Albeit the Solomon four group design contains two experimental and two control groups, it is illustrated in the following Table (1). According to Solomon, this modification of the currently used control group design has potentialities for demonstrating and weighting certain interaction effects (Solomon, 1949). As Babbie (2013) mentioned in his book, Solomon design not only eliminates the interactions between testing and the treatment, it also provides data for comparisons that will reveal the amount of such interaction that occurs in classical designs.

Campbell and Stanley (1966) suggested three basic patterns of true experimental research designs:

Pretest-posttest control group design, posttest-only control group design and Solomon four group design (also cited in Salkind 2010). Despite the advantages in strengthening both internal and external validity of research (Newman & Newman, 1994), the Solomon-four group design is seldom used especially in social sciences (Spector, 1981) because of the four group requirements and statistical difficulties (McCambridge et al., 2011).

Table 1. Solomon four group design

| Group | Pre-Test | Training | Post-Test |
|---|---|---|---|
| $E_1$ | $T_1$ (Q1) | X | $T_2$ (Q2) |
| $C_1$ | $T_1$ (Q3) | | $T_2$ (Q4) |
| $E_2$ | | X | $T_2$ (Q5) |
| $C_2$ | | | $T_2$ (Q6) |

*Note.* E: experimental group; C: control group; X: treatment condition.

T: testing condition, 1 = pre-test, 2 = post-test; Groups are labeled as Q1…Q6 for analyses.

Adapted from Gibson, et al. 1988.

While Solomon's suggestions about statistical analysis of his experimental design have been criticized by other researchers, Campbell & Stanley (1963) suggested exploring statistical solution for the Solomon four-group design by use of 2 X 2 analysis of variance design. Newman and Newman (1994), Breakwell (2004) and also Glinger and Morgan (2000) accepted the design as a factorial design and supported the idea. However, Spector (1981) addresses that there would be missing data for half of the subjects in Anova designs. His suggestion was to conduct the analysis in stages. Additionally, Braver, and Braver (1988) proposed using meta-analysis also Sawilowsky and Markman (1988) and Sawilowsky, Kelley, Blair, and Markman (1994) supported this idea with their comments and contributions. According to the researchers meta-analysis demonstrated superior power of using meta-analytic techniques instead of customary analysis of using ANOVA (McGhee, 2009).

Faigenbaum and Costello (1975) used student t test for Solomon design. Holdnak et al. (1990) used 2 X 2 Anova for testing self-esteem training effectiveness. Cinco (1981) investigated the effects of group counseling on the personality and behavior of children with behavior problems. Firstly she performed 14 two-way ANOVA's and for other dependent variable (ordinal data) she used Wilcoxon Matched Pairs Signed-Ranks Test (citied in Sevilla, Ochave, Punsalan, Regala, & Uriarte, 1992). Randolph and Myers (2013) discussed using independent samples t test which causes labor intensive and increased risk of making a Type 1 error and suggested Anova tests for Solomon analyzing. Cortese (2007) also offers paired samples t test and Anova tests for Solomon's four group design. Similarly McGahee (1998) and McGahee and Tingen (2000) utilized several different types of analysis concerning a series of hypothesis and also for comparison of Solomon groups Babbie's suggestion is followed by paired samples t test. There exists disagreement amongst scholars about statistical method for Solomon design. Recent studies have different suggestions. It is also stressed in studies that the hypotheses and the data types are also important for the statistical method selection. In this study paired samples t test is found suiTable for the data type and hypotheses of the study.

*2.4 Research Model and Hypotheses Development*

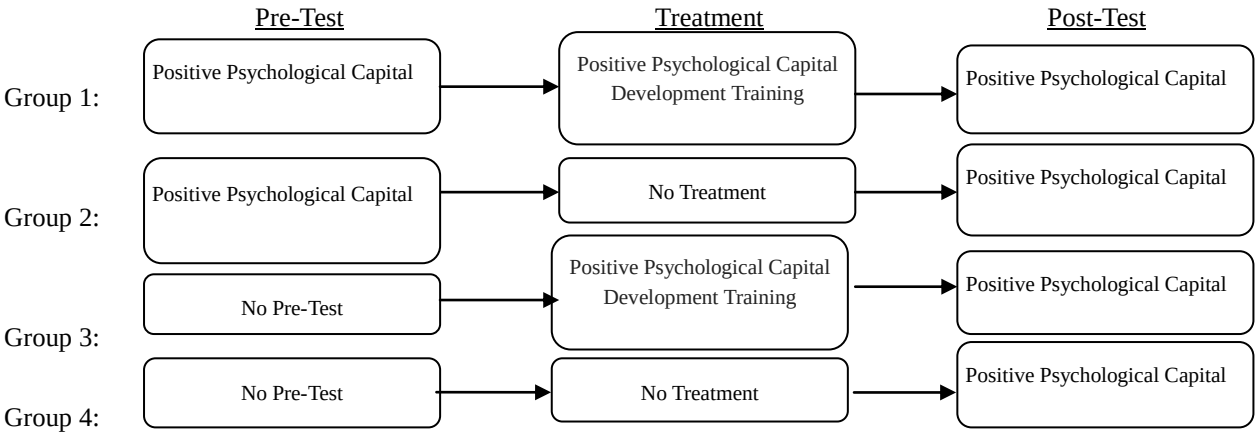


Figure 1. Research model

The main hypothesis based on the above mentioned literature and research model of the study are given in the following manner:

$H_1$: Positive psychological capital development training increases positive psychological capital capacities of participants.

According to Isaac and Michael (1981), factors that threaten internal validity are: History, maturation, pretest effects, instruments, statistical regression toward the mean, differential selection of participants, mortality, and interactions of factors and threats to external validity include: Interaction effects of selection biases and treatment, reactive interaction effect of pretesting, reactive effect of experimental procedures, and multiple-treatment interference. The Solomon four-group design enables a researcher to control threats both internal and external validity by controlling maturation, history and pretesting. Post-test scores of the experimental and control groups are affected by several factors, Q2: Pretesting-maturation-treatment-history Q4: Pretesting-maturation-history, Q5: Treatment-maturation-history and Q6: maturation-history. However, comparing the groups prevent from omitting the threats.

In the following the sub-hypotheses of the study are cited. From this design, it will be possible to find out the following results. All sub-hypotheses are designed for both internal and external validity and effectiveness of the treatment.

2.4.1 Treatment Effectiveness

$H_1$: $Q1 \neq Q2$; $H_2$: $Q2 = Q5$

Hypothesis 1 and 2 refers to the treatment effect that is if the hypotheses are accepted the treatment itself has impact on the participants. As seen on the Table 3, this treatment's effect is statistically significant. Also the comparison between Q2 and Q5 allows the researcher to determine the effect that the pretest has had upon the treatment. If the posttest results for these two groups differ, then the pretest has had some effect upon the treatment and the experiment is flawed (Shuttleworth, 2009).

2.4.2 History & Maturation

$H_3$: $Q3 = Q6$; $H_4$: $Q1 = Q6$

The comparison between the Q3 & Q6 and Q1 & Q6 allows the researcher to establish if any external factors have caused a temporal distortion. For example, it shows if anything else could have caused the results shown and is a check upon causality (Shuttleworth, 2009). At the same time, maturation is controlled with the same hypotheses.

$H_5$: $Q1 = Q3$

Additionally acceptance of the hypotheses ($H_3$, $H_4$, and $H_5$) also supports that the groups are related groups that is participants have homogeneous characteristics.

2.4.3 Pretesting

$H_6$: $Q3 = Q4$ (Pre-Test Bias); $H_7$: $Q4 = Q6$; $H_8$: $Q1 = Q4$ (Pre-Test Effect)

$H_6$ hypothesis is investigated to determine if the actual act of pretesting influenced the results. If the results indicate no significant difference, pre-test has no effect on participants. $H_7$ which refers the comparison between the Q4 and Q6 shows whether the pretest itself has affected behavior, independently of the treatment. If the results are significantly different, then the act of pretesting has influenced the overall results and is in need of refinement (Shuttleworth, 2009). Acceptance of the hypothesis $H_8$ also controls pre-test effect on participants.

## 3. Methodology

### *3.1 Research Design*

Experimental design has been used to answer the research question of the study. An experimental design is a plan for assigning experimental units to treatment levels and the statistical analysis associated with the plan. It is suggested to use a 'single-blind' procedure in which participants are not informed about the nature of their treatment and, when feasible, the purpose of the experiment in order to minimize the effects of demand characteristics (Kirk, 1995). So in the study participants are not informed about the procedure and content of the treatment. At the same time period all data gathered and treatments are performed in the same week in order to control external factors (etc. exams).

In this study a single scale which assesses positive psychological capacities of participants is used (psycap-24 item version). The scale is adapted from Luthans et al. (2007b) and a 6-point likert type scale ranging from

"strongly disagree" to "strongly agree" is used in the measurement (original format). Demographic properties are similar for all participants. Age allocations are between 18 and 23. In addition to this, all of the participants are university students (from business department) and 52% of them are female.

Data is gathered from management students from Gebze Technical University in May 2014. 164 questionnaires, out of which four invalid and three were incomplete, were received. The resulting 156 valid questionnaires were used in the study. Questionnaires were allocated as hard copy (for pre-tests) and via e-mail (for post-tests). Solomon's four group and six analyzing groups (Q1…Q6) have been developed as explained in the following.

(1) Assessed experimental group pre-tests are applied to 65 management students and the following week the group participated the psycap development training. The training program utilized a sample of 61 management students in two sections (Q1). They were told to have "career management" training. The treatment groups received a two-hour training intervention conducted by the same facilitator (Ö znur Gülen Ertosun). About 10 days later the treatment, totally 41 valid questionnaires are obtained as post-test of the experimental group (Q2).

(2) Assessed control group received the same questionnaire in two time point about two week periods (Q3-Q4). As a pre-test 35 and post-test 24 valid questionnaire obtained (1 questionnaire from 25, was incomplete).

(3) For unassessed experimental group 25 management students participated to the training program (two-hour) and about 10 days later 24 participants answered the questionnaire (Q5). All the three training sections are organized in the same week.

(4) Rested management students (39 answered but 36 of them was completed) fall within unassessed control group, solely filled the questionnaire in one time point (Q6).

Table 2. Frequency and mean values of the groups

| | E1 | | C1 | | E2 | C2 | Total |
|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q1+Q2+Q3+Q4+Q5+Q6 |
| Gender %-Male | 31% | 32% | 63% | 48% | 52% | 60% | 48% |
| Gender %-Female | 69% | 68% | 37% | 52% | 48% | 40% | 52% |
| Total Number | 61 | 41 | 35 | 24 | 24 | 36 | 156 |
| Psycap Mean | 4,3780 | 4,5354 | 4,3678 | 4,4340 | 4,6951 | 4,4271 | |

### *3.2 Analyses and Findings*

Positive psychological capital scale construct validity is testified in Luthans et al's study (Luthans, Avolio, Avey, & Norman, 2007a) and cronbach alpha value is estimated above .70 (in this study .797). Paired samples t test is performed to test all hypotheses at the same time (this is also effective to prevent from type 1 and type 2 error).

According to analysis results all our hypotheses are accepted. As a result, treatment found effective ($H_1$: Q1 ≠ Q2; $H_2$: Q2 = Q5) and biases are controlled ($H_3$: Q3 = Q6; $H_4$: Q1 = Q6 (History & Maturation); $H_5$: Q1 = Q3 (Homogeneity); $H_6$: Q3 = Q4 (Pre-Test Bias); $H_7$: Q4 = Q6; $H_8$: Q1 = Q4 (Pre-Test Effect)). As results are shown in Table 3, for Q1 and Q2 p value is lower than 0.5 (0.45) and for all other pairs significance value is upper than 0.5. That is there is a significant difference between pre-test and post-test results for the assessed experimental group and there is no significant difference for other test values.

Table 3. Paired samples t test for comparison of the groups

| Paired Groups | | Paired Differences | | | | | |
|---|---|---|---|---|---|---|---|
| | | Mean Dif. | Std. Deviation | Std. Error Mean | t | df | Sig.(2-tailed) |
| Pair1 | (Q1-Q2) | -,29167 | ,76423 | ,13953 | -2,090 | 29 | ,045 |
| Pair2 | (Q3-Q4) | -,21711 | ,73815 | ,16934 | -1,282 | 18 | ,216 |
| Pair3 | (Q2-Q5) | -,10156 | ,52263 | ,13066 | -,777 | 15 | ,449 |
| Pair4 | (Q1-Q6) | -,32692 | ,90429 | ,17735 | -1,843 | 25 | ,077 |
| Pair5 | (Q3-Q6) | -,17210 | ,67400 | ,14054 | -1,225 | 22 | ,234 |
| Pair6 | (Q4-Q6) | ,04167 | ,61442 | ,14096 | ,296 | 18 | ,771 |
| Pair7 | (Q1-Q3) | -,09568 | ,88561 | ,17043 | -,561 | 26 | ,579 |
| Pair8 | (Q1-Q4) | -,19384 | ,79966 | ,16674 | -1,163 | 22 | ,257 |

## 4. Conclusion and Discussion

Although there are a growing number of articles about positive psychological capital, the study is done in order to fill the gap as Luthans et al. (2006) suggested that psycap development should be replicated in different cultural contexts. There is no empirical study out of Luthas et al. (2006, 2008, 2010, & 2012) replicating the treatment. So this study is a start point to contribute on the human resource development programs especially for Turkey. This study also provides empirical support for the effectiveness of the psycap development is possible with micro interventions (a training program of about 2 hours). In addition to this Solomon's four group design is examined thoroughly and performed. As discussed in earlier sections, the Solomon four group design has little attention especially in social sciences, too few study is done conducting an organizational training with Solomon design (etc. Holdnak et al., 1990) this study also has contribution to the related literature.

Further researchers can expand this model by adding individual and/or organizational factors as to moderate or mediate variables. And also predicting outcomes such as performance, wellbeing or engagement could be beneficial. Our hypothesis is limited to the general construct of psycap, researchers may investigate the effect of development programs on each individual dimension (hope-optimism-resilience-self efficacy) separately. This study has been conducted with student participants, similar studies also should be replicated with employees from different sectors. Participants' individual characteristics such as demographics, personality, experience, etc. should also be considered as moderators. In addition to these, as Luthans et al. mentioned psycap development also can be effective on collective psycap, and this proposal can be empirically investigated in a longitudal study. Experimental design is an important aspect especially for social and behavioral sciences, so Solomon or alternatives controlling internal and external validity should be discussed much more in the future studies.

Our experiment conducted in a developing country confirm the findings of recent empirical studies on the positive effects of psycap development programs to the performance of both employees and firms. Accordingly, as for the managerial implications, not only during the psycap development programs but also in daily manager-employee interactions such concepts as hope, optimism, resilience and self-efficacy should be given equal importance as other basic work values. Especially middle managers should accept and adopt these values. However, psycap development may produce some side effects to the organizations. As earlier studies emphasize, congruence between the individual values and goals of the employees and the strategic intentions and goals of their company is an important opportunity for these companies (e.g. Eren et al., 2000); but if they are not compatible both employee motivation and commitment and company performance may decline. Beyond empirical findings during the conversations with participants, it is seen that increased awareness and willingness about psycap may sometimes lead some participants to begin to look for other organizations to work if they believe that in the present organization their opportunities to increase their self-efficacy or resilience cannot be achieved. Therefore, the developers of pscycap training programs should pay extra attention for the concept of goal congruence, otherwise training may end up with increased turnover. As a conclusion, we may suggest that psycap is very beneficial but development programs should be designed very carefully and implemented by experienced moderators.

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# A Short Note on the Application of Chow Test of Structural Break in US GDP

Hari S. Luitel[1] & Gerry J. Mahar[1]

[1] Department of Business & Economics, Algoma University, Sault Ste. Marie, Ontario, Canada

Correspondence: Hari S. Luitel, Department of Business & Economics, Algoma University, Sault Ste. Marie, Ontario, P6A 2G4, Canada. E-mail: hari.luitel@algomau.ca

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**Abstract**

In 1997, the North American Industry Classification System (NAICS)--the standard for use by Federal statistical agencies in classifying business establishments for the collection, tabulation, presentation, and analysis of statistical data describing the US economy--replaced the Standard Industrial Classification (SIC) system. There are substantial differences in the method of data reporting under the SIC system and the under NAICS. In this short note, using a Chow Test, we formally provide evidence of a structural break in the US GDP data due to the switch from the SIC reporting system to the NAICS reporting system.

**Keywords:** Chow test, structural break, US GDP, statistical methods, econometric methods, single equation model

## 1. Introduction

In 1997, The US Department of Commerce Bureau of Economic Analysis (BEA) switched reporting gross domestic product (GDP) and other national accounts from Standard Industrial Classification (SIC) System to North American Industry Classification System (NAICS). The NAICS was developed jointly by the US Economic Classification Policy Committee (ECPC), Statistics Canada, and Mexico's Instituto Nacional de Estadistica y Geografia (INEGI), to allow for a high level of comparability in business statistics among North American countries. The NAICS was constructed within a supply-based, or production-oriented, conceptual framework where establishments using similar production processes to produce goods and services are grouped to form industries. The NAICS allows for the identification of 1,170 industries compared to the 1,004 found in the SIC system. The increase in the number of categories was substantial. For a detail discussion of the differences between the SIC and the NAICS, see Issue Papers 1 through 6 of Economic Classification Policy Committee (1993a, 1993b, 1993c, 1993d, 1993e, and 1993f). Our objective in this short note was to apply the Chow Test of a structural break to determine if this test would be capable of identifying a break in the time series data of the US GDP due to the switch from the SIC reporting system to the NAICS reporting system in 1997.

A time series data set contains observations ordered and recorded in time for the same variable. In macroeconomics, a structural break occurs when there is an unexpected shift in the data of a time series. Knowledge of a structural break in the time series data of US GDP is important for a number of reasons: Firstly, a structural break may affect any or all of the underlying model parameters which have different implications. For example, this can lead to forecasting errors and to unreliability of the model in general. Researchers using the time series data of US GDP could easily reach quite opposite conclusions--hardly an example of sound scientific practice (Note 1). Secondly, notwithstanding the fact that the time series data of US GDP has been one of the most widely studied and reported macroeconomic variables, it continues to be closely monitored as a leading indicator and measure by investors, academics as well as government officials all around the world. Thirdly, many leading econometrics textbooks have used the data series of US GDP to illustrate examples of various time series analysis in the economics curriculum and many influential articles in economics journals such as those by Nelson and Plosser (1982), Engel and Granger (1987), Perron (1989), Zivot and Andrews (1992), to name a few, have used the data series of US GDP in their analysis. Lastly, the National Bureau of Economic Research (NBER) uses the data series of US GDP to declare whether and/or when the US economy enters and exits a recession (Note 2). In this note, we hope to shed some light on previously unexplored characteristics of the time series data of US GDP that might be helpful to others working with the GDP measure in academia and those employed in

industry or in government.

## 2. Empirical Analysis and Results

From 1973 to 2014, the US GDP data covered two different time spans (Note 3). Up to 1996, the BEA reported US GDP data according to the Standard Industrial Classification (SIC) System. In 1997, the SIC system was replaced by the North American Industry Classification System (NAICS). There were substantial differences in the method of data reporting under the SIC system and under the NAICS. Therefore, we suspected that the parametric values governing the data generating process of US GDP under these two regimes would likely be different. To investigate further, we obtained annual data of US GDP for the period from 1973 to 2014. Data was gathered from the official website of the United States Department of Commerce, Bureau of Economic Analysis (BEA) (Note 4).

Visual inspection of the data is usually a first step in an analysis of structural break. *As can be seen in Figure 1, a visual inspection of the actual data of US GDP did not show a break.* Thus, we need to use a Chow test (F-test) to determine if a structural break had occurred.

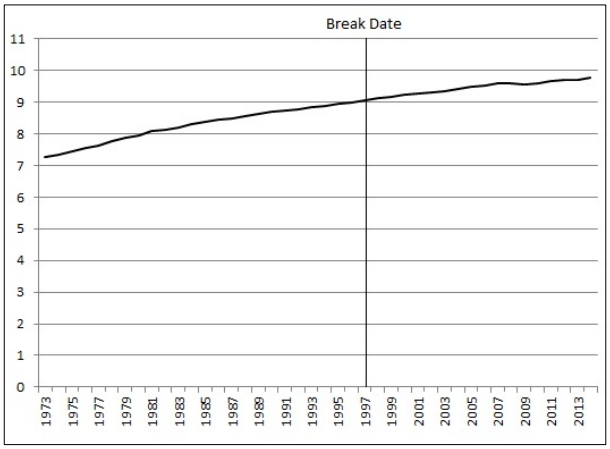


Figure 1. Log of US GDP (1973-2014)

Source: Bureau of Economic Analysis, http://www.bea.gov/.

Web access date: September 18, 2015.

A linear time-trend model is a simple regression model in which the independent variable is the raw index or any ascending sequence of equally spaced numbers (daily, weekly, monthly, quarterly, and annually etc.). A growth rate time-trend model includes the underlying rate of economic growth that can be maintained without inflationary pressures. The choice between a linear time-trend model and a growth rate time-trend model depends on whether one is interested in the absolute or relative change in GDP. For comparative purposes, the relative change is usually of greater interest to economists and more important than an absolute change in GDP. Therefore, we estimated a semi-log linear time-trend model of the form:

$$ln(Y_t) = \beta_0 + \beta_1 X_t + u_{1t} \quad (1)$$

where $ln(Y_t)$ represents natural log of US GDP, $X_t$ is the time variable that varies from 1973 to 2014 and $u_{1t}$ is the error term. Equation (1) is called a semi-log model because only the regressand appears in the logarithmic form.

We know the exact date when the BEA switched reporting the GDP and other national accounts from the SIC to the NAICS and we can use ordinary least squares (OLS) regression to estimate the parameters in equation (1). Our objective was to determine if the switch in the method of data reporting from the SIC to the NAICS had changed the model parameters. We posed the question: Did the regression coefficients--$\beta_0$ and $\beta_1$--remain stable over the entire time period? To address this question, we divided the data into two time periods, 1973-1996 and 1997-2014, and estimated the two separate regressions as follows:

$$\textbf{Period 1973-1996: } ln(Y_t) = \alpha_0 + \alpha_1 X_t + u_{2t} \quad (2)$$

$$\textbf{Period 1997-2014: } ln(Y_t) = \delta_0 + \delta_1 X_t + u_{3t} \quad (3)$$

where $u_{2t}$ and $u_{3t}$ are assumed iid.

If the data generating processes under the SIC and the NAICS systems were to be the same, we would expect that $\beta_0 = \alpha_0 = \delta_0$ (i.e. the intercept would not be statistically significantly different from each other) and $\beta_1 = \alpha_1 = \delta_1$ (i.e., the slope coefficients would not be statistically significantly different from each other). To examine this, we estimated three regressions, equations (1), (2), and (3) above, and obtained their respective residuals sums of squares. The results are reported in Table 1. Note that there were 42 observations: 24 in the 1973-1996 time period and 18 in 1997-2014 time period.

Table 1. OLS regression results

| **Regression under the assumption of parametric stability** | **Regressions under the assumption of parametric variability** | |
|---|---|---|
| **Time Period 1973-2014:** | **Time Period 1973-1996:** | **Time Period 1997-2014:** |
| $ln(Y_t) = \beta_0 + \beta_1 X_t + u_{1t}$ | $ln(Y_t) = \alpha_0 + \alpha_1 X_t + u_{2t}$ | $ln(Y_t) = \delta_0 + \delta_1 X_t + u_{3t}$ |
| $ln(\hat{Y}) =$ -109.834 + 0.059$X_t$ | $ln(\hat{Y}) =$ -142.154 + 0.075$X_t$ | $ln(\hat{Y}) =$ -71.239 + 0.040$X_t$ |
| $t$ = (33.93) (36.64) | $t$ = (32.29) (34.16) | $t$ = (21.31) (24.14) |
| $n = n_1 + n_2 = 42$ | $n_1 = 24$ | $n_2 = 18$ |
| $R^2 = 0.9711$ | $R^2 = 0.9815$ | $R^2 = 0.9733$ |
| $RSSR =$ 0.6506 | $SSR_1 =$ 0.1245 | $SSR_2 =$ 0.0215 |
| df = 40 | df = 22 | df = 16 |

*Note.* Figures in the parenthesis are absolute *t* statistics.

Source: Authors calculations.

Under the assumption that there would be stability of parameters (i.e., the regression coefficients did not change over the period), the residual sum of squares obtained from equation (1) is called the restricted residual sum of squares (RSSR), and will have (n-k) degrees of freedom (*df*), where $n = n_1 + n_2$. The assumption that the error terms ($u_{2t}$ and $u_{3t}$) in equation (2) and equation (3) are iid implies that the two samples (i.e. sample periods 1973-1996 and 1997-2014) are independent. By adding the residual sum of squares from equation (2) and equation (3), we get the unrestricted residual sum of squares (USSR), which has ($n_1 + n_2 - 2$k) *df*, where $n_1$and $n_2$ are the number of observations in the first and second periods and k is the number of parameters estimated in each model (two in our example). If parameters are stable, RSSR and USSR will not be statistically different. Alternatively, if there was no stability of parameters, the two residual sums of squares would differ. This can be tested as below:

$$F = \frac{(RSSR - SSR_1 - SSR_2)/k}{(SSR_1 + SSR_2)/(n-2k)} \sim F_{[k,(n-2k)]} \tag{4}$$

The F test above, or the variance ratio test, is often referred to in econometrics as the "Chow test," due to Chow (1960). This test statistic has k and (n-2k) degrees of freedom because the restricted regression model has k parameters whereas the unrestricted regression model has 2k parameters. It will be exactly distributed as F(k, n-2k) if the error terms were normal and independent of the fixed regressors X, and it will be asymptotically distributed as $x^2(k)$ under much weaker conditions (MacKinnon 1989, pages 78-79). If the computed F statistic is not statistically significant, say, at 1 percent, 5 percent or 10 percent level of significance, it would indicate that the parameters were stable. However, if the computed F statistics were statistically significant, we would reject the hypothesis that there was stability of parameters and it would mean that the data generating process of the US GDP had changed over time.

As reported in Table 1, the various sums of residuals squares are as follows: RSSR = 0.6506; $SSR_1$ = 0.1245; $SSR_2$ = 0.0215. Inserting these values in equation (4), we obtain:

$$\frac{(RSSR - SSR_1 - SSR_2)/k}{(SSR_1 + SSR_2)/(n-2k)} = \frac{(0.6506 - 0.1245 - 0.0215)/2}{(0.1245 + 0.0215)/(42 - 2\times 2)} = 65.67 \tag{5}$$

In our example, this *F* statistics follows the F distribution with 2 and 38 degrees of freedom in the numerator and denominator. The 1 percent critical value is close to 5.18 as reported in Green (2000; Table B5, page 961). Because the computed F value far exceeds the tabulated critical value, we would reject the hypothesis of stability of parameters (i.e. reject $H_0$: $\beta_0 = \alpha_0 = \delta_0$ and $\beta_1 = \alpha_1 = \delta_1$). The results indicate that the models for the two periods are systematically different, beyond a simple switch from the SIC to the NAICS and we can conclude that the data generating process under the SIC and under the NAICS was not the same.

## 3. Summary and Conclusion

In 1997, the US Department of Commerce Bureau of Economic Analysis (BEA) switched reporting gross domestic product (GDP) and other national accounts from Standard Industrial Classification System (SIC) to North American Industry Classification System (NAICS). Because there are substantial differences in the method of data reporting under the SIC system and the NAICS, we were interested to determine if the switch in the method of data reporting from the SIC to the NAICS changed the model parameters of US GDP. In this short note, we applied a Chow Test of structural break. The test results showed a structural break in the US GDP time series data due to the switch from the SIC reporting system to the NAICS reporting system.

Our research findings have several implications. First, if the structural break in the US GDP of 1997 is not properly taken into account, researchers in public policy using US GDP time series data may easily arrive at misleading conclusions. Second, it is an interesting research question for researchers and practitioners working with the US GDP measure to know how any forecast errors due to a structural break in the US GDP of 1997 would compare with its actual observation either before and/or after 1997. This needs further investigation. Above all unit root property of the data is inconsistent with the structural break. A structural break implies that the parameter values governing the data generating process have changed. However, the current literature on unit root treats the unit root property of the data as not being affected by a structural break. The implications of the structural break findings in this paper in the context of the uniqueness of unit root and cointegration analysis further complement Luitel and Mahar (2015).

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**Notes**

Note 1. For a criticism of modern mainstream economic modeling approach, which fails to properly account for the non-observed facts, see Leontief (1971). For a recent example of criticism of mainstream economic modeling approach, see Luitel (2014).

Note 2. The financial press often defines a recession in terms of two consecutive quarters of decline in real GDP. According to NBER, "a recession is a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales."

Note 3. Perron (1989) shows a structural break in US GNP in 1973. For our data analysis, we, therefore, consider only the time period since 1973.

Note 4. The BEA reports the data in billions of dollars. We first took the natural log of the data as reported by the BEA without other manipulation and then analyzed it. The data used in the analysis is available from the authors upon request.

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# The Pyramid of Corporate Social Responsibility (CSR): An Empirical Examination in the Tunisian Context

Tarek Ben Noamene[1] & Sara Elouadi[2]

[1] Emirates College of Technology, Millenium Towe, Handan Stret, Abou Dhabi, UAE

[2] University of Casablanca, Morocco

Correspondance: Dr. Tarek Ben Noamene, Emirates College of Technology, Millenium Tower, Handan Stret-Abou Dhabi, UAE. Tel: 971-564-398-193. E-mail: tarek.noa@gmail.com

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**Abstract**

The concept of CSR was subject to multiple approaches and research perspectives (Gond & Igalens, 2008). Its application in the Anglo-Saxon context revealed a lack of consensus on identifying its dimensions (Auperles et al., 1985). In this study, we will try to empirically explore this concept in the Tunisian context. In this regard, a quantitative questionnaire-based survey of Tunisian companies of highlights the four-dimensional nature of social responsibility, with philanthropic responsibility standing out as the most influential dimension in CSR perception in Tunisia.

**Keywords:** corporate social responsibility, Caroll model, Tunisian context

## 1. Introduction

With the advent of globalization and the development of international trade, the concept of corporate social responsibility (CSR) has been receiving an increasing acclaim. The most popular definition of CSR is the one proposed by the European Commission in its 2001 Green Paper; "companies' voluntary integration of social and environmental concerns in their business operations and in their interaction with their stakeholders."

However, most research has focused on the nature of CSR in developed countries, yet little research has examined the same concept in developing countries.

In this paper, we will examine CSR in Tunisia. We will try to determine the concept of CSR in Tunisian companies using the model of Carroll (1979).

Our approach consists of a quantitative questionnaire-based survey of managers of a sample of Tunisian companies. First, we will present the CSR concept while showing the absence of a universal conception of it. Then, we will develop an overview of the most common representations of CSR. Second, we report on an empirical analysis as part of a quantitative study of a sample of Tunisian companies.

## 2. Literature Review

Despite the important contributions of recent decades, there is still no precise definition of CSR. Several studies have been developed on this topic; the most influential are those of Bowen (1953) and Carroll (1979).

There are several theoretical approaches to social responsibility (Gond & Igalens, 2008).

Howard Bowen is considered the founding father of the concept of social responsibility. In his book "Social Responsibilities of the Businessman", the author defined managers' CSR as "a series of obligations resulting in a series of policies, decisions and course of actions consistent with the objectives and values of society" (Germain Trébucq, 2004). His book aims at educating executives the values "considered desirable in our society."

Milton Friedman (1970) chooses a different conception of CSR as advanced by his predecessors. Indeed, the author considers the social responsibility of any business as the achievement of gains for shareholders "The social responsibility of business is to increase its profits".

It was not until 1979 when Carroll advocated a conception of CSR that takes into account the recommendations of those affirming the need for companies to be aware that they are responsible for their business towards all their stakeholders, not just shareholders and monetarists like Friedman, advocating thus a CSR based on the

creation of value for the company.

According to Carroll (1979), Corporate Social Responsibility should be approached in three ways: Organizational responsiveness, the different categories of CSR and social concerns of the organization.

Carroll defines the concept of CSR as a set of obligations vis-à-vis society. The author distinguishes four types of obligations: economic (be profitable, manufacture goods complying with quality standards, ..), legal (compliance with laws and regulations), ethical (act according to moral principles shared by society) and philanthropic (benevolent actions and charity). According to the author, CSR is "the set of obligations that the company has vis-à-vis society (including) economic, legal, ethical and discretionary categories".

This definition has been taken by the European Commission in 2001 which considers CSR as "the voluntary integration by companies of social and environmental concerns in their business operations and in their interaction with their stakeholders."

The American literature remains the most exhaustive on the concept of CSR. Indeed, several models have been developed to provide a conceptual framework for social responsibility, like Wood (1991), Watrick and Cochran (1985), Clarkson (1995) Quazi and O'Brien (2000).

*2.1 Conceptual Model of CSR*

The work of Carroll (1979) represents the first real conceptual model of CSR.

Indeed, the author proposes a typology of responsibilities in the shape of a pyramid in which economic obligations are the basis of responsibility. Second, we find legal responsibilities followed by ethical responsibilities and at the peak of the pyramid we find philanthropic responsibilities.

Economic responsibility refers to the traditional economic role of a company, which is essentially the production of goods or services under profitable conditions. In fact, the company is expected to first ensure its continuity on the market, create jobs and pay taxes. Definitely, by this economic dimension, the role of the company would meet the requirements of its stakeholders in this case, shareholders, employees, consumers and finally the State.

The second tier of the pyramid is legal responsibility, which refers to the obligation to comply with the laws in society. According to Carroll (1979), the company should achieve its economic responsibilities while respecting the legal and institutional framework.

Ethical responsibility refers to obligations that members of society would expect companies to assume yet they are not codified by laws. In this sense, the company should act honestly towards society even in the absence of legal constraints.

Finally, at the peak of the pyramid, we find discretionary responsibility i.e. discretionary actions of individuals like philanthropic activities.

*2.2 CSR under Its Different Perspectives*

Capron and Quairel (2007) highlights the fundamental differences between the American and European conceptions of CSR, based on different cultural values, unique intellectual influences and the specific structure of the company. In particular, according to the authors, the American conception of the company is contract-based while the European design is institution-oriented.

Indeed, the American concept of CSR is based on ethical and religious considerations (Aggeri et al., 2005). In this sense, CSR is summarized by many American companies as foreign philanthropic actions meant to tarnish their business activities (Capron & Quairel, 2007).

On the other hand, and in terms of research on CSR, empirical tests of Caroll's model (1979) point to differences between countries. Indeed, the study of Maignan and Ferrell (2003), whose objective is to identify consumers' representations of CSR, confirms the superiority of the legal dimension followed by the ethical dimension in the French and German contexts.

The primacy of economic responsibilities was highlighted by Pinkston and Caroll (1996) in several European countries like England, France, Germany, Switzerland and Sweden, but also in Japan and the USA.

These conclusions consolidate those obtained previously by Aupperle et al. (1985) and Aupperle (1982).

In the Tunisian context and despite the predispositions of Tunisian managers to engage in a socially responsible perspective, the practice of CSR remains very shy. Indeed, according to a study under the Development Partnership with the Private Sector framework (GIZ-DPP) in 2012, the perception of CSR by Tunisian companies is "partial and differentiated and responds more to immediate concerns resulting from an external

constraint or an expected benefit than to a long-term vision".

Furthermore, the study suggests the existence of major difficulties in the implementation of CSR. These barriers mainly relate to Tunisian managers' lack of conviction, but also to a cultural resistance to the "very principle of accountability". The study also puts the emphasis on the difficulties associated with means. Indeed, Tunisian firms suffer from a skills shortage, both internally and externally, and does not have the financial resources for the implementation of a CSR policy.

Academically, research on CSR in Tunisia is still scarce. Although the Tunisian context seems to be a fertile ground to study CSR because of the existence of several multinational companies and the cultural specificity of the Tunisian society, which is primarily centered on Islamic morality, conceptual contributions remain very limited (Bousourra & Zribi, 2008).

## 3. Methodology

Carroll's typology is a reference model in the literature on Corporate Social Responsibility (Jamali, 2008; Capron & Quairel-Lanoizelée, 2007; Igalens, 2008; Maignan et al., 1999).

Carroll's model (1979) shows that CSR has four dimensions: economic, legal, ethical and philanthropic (or discretionary) responsibility. These four dimensions were operationalized by Maignan et al. (1999). More other studies (Lin et al., 2010; Maignan & Ferrell, 2003) empirically adopted the four-dimensional nature of CSR. From there, it is necessary to study CSR as a set of four variables.

Our study's objective is to determine how Tunisian leaders integrate CSR into their businesses using Carroll's pioneering model of CSR as a framework.

We will try, through a "questionnaire-based" quantitative study as a data collection method, to answer the following research question: What is the most influential CSR dimension adopted in Tunisia?

### *3.1 The Measurement Scale of CSR*

To measure CSR practices in Tunisia, we used the scale of Maignon et al. (1999), which has already been adopted by several scientific studies. This scale, which is in line with that proposed by Aupperle et al. (1985), and which takes into account the four-dimensional nature of CSR (the economic, legal, ethical and philanthropic dimensions) replicates Caroll's model (1979). Our questionnaire reproduces the 18 items of the scale. However, we will proceed with adjustments to the Tunisian context according to the methodology of Besson and Haddjadj (2003).

In our study, we will use a factor analysis to determine the main factor structure likely to reproduce the dimensions of Caroll's model (1979). We will interpret the percentages of explained variances to detect the most influential responsibility dimension of CSR in Tunisia.

In another hand we will use the multiple linear regression analysis to determine with more precision the order of responibilities.

-Independent variable: CSR ($Y$)

-Dependant variables: Economic component (ECO)-Legal component (LEG)-Ethical component (ETH) -Philanthropic component (PHIL)

Model:

$$\hat{Y} = b_0 + b_1 ECO_1 + b_2 LEG_2 + b_3 ETH_3 + b_4 PHIL_4$$

$b_0 b_1 b_2, b_3, b_4$ : Coefficients.

We conducted an exploratory survey of a total sample of 140 unlisted Tunisian companies belonging to different sectors and having different sizes (industry, business + services). In this regard, we administered a questionnaire to line managers (61% administrators, 17% technical managers, 22% managers) between April and June 2014. A total of 110 companies is selected with a response rate of 78% and 330 retained questionnaires (some questionnaires were eliminated because of negative correlations between respondents from the same company).

The responses from the same companies were aggregated around the average to form a score per company (El benna & Child, 2007; Gherib, 2011).

### *3.2 Results of the Tests and Discussion*

Table 1. Results of the factor analyses

| Component | Items | Cronbah's Alpha | Variance Extracted |
|---|---|---|---|
| Ethical<br>*A company which we can trust* | 0,78 | 0.696 | 13,34% |
| Economic<br>*Profit maximization* | 0,80 | 0.640 | 17,37% |
| Legal<br>*Respect of legislation on employees' salaries and recruitment* | 0,69 | 0.763 | 27,10% |
| Philanthropic<br>*Partnerships with local associations, institutions and schools.* | 0,71 | 0.727 | 42,19% |
| | KMO=61 Total=70% | | |

Cronbach's alpha coefficients pointed to the most representative items of the dimensions. The percentage of variance explained indicates which of the four components that contributes most in explaining the construct CSR.

We find that the philanthropic dimension is highly represented by the item "partnerships with local associations, institutions and schools" with a coefficient of about 0.727 and an explained variance of 42.19% for the same component. "Respect of legislation on employees' salaries and recruitment" is the most representative of the legal dimension (Cronbach = 0.763 and an explained variance of 27,10%).

The economic dimension is highly represented by the item "profit maximization" with a Cronbach's alpha equal to 0.640 and an explained variance of 17.37%. Finally, the ethical dimension is represented by the item "a company which we can trust" (Cronbach = 0.696 and explained variance = 13.34%).

Table 2. Regressions results

| | Models | non-standard Coefficients | | Standard Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | A | Standard Error | Bêta | | |
| | (Constant) | 44,833 | ,265 | | 168,887 | ,000 |
| | Philanthropic | 2,713 | ,298 | ,405 | 9,116 | ,000 |
| 1 | Legal | 2,591 | ,296 | ,387 | 8,751 | ,000 |
| | Economic | 2,120 | ,294 | ,317 | 7,211 | ,000 |
| | Ethical | 1,742 | ,273 | ,260 | 6,379 | ,000 |

The regression results confirm the predominance of the philanthropic dimension in the CSR construct followed by the legal and the economic dimension. However the ethical component is classified at the last position.

Indeed in the Table (2) the social responsibility of Tunisian companies is measured primarily by philanthropic responsibility. This clearly indicates that philanthropic contributions are important in the construct of CSR in Tunisia (coeff = 2,713). The dominant role of legal responsibility, which comes second (ceoff = 2,591), would suggest that there is a strong corporate commitment to respect the law and comply with the laws regulating workers' rights.

Rule of law is crucial when it comes to corporate social responsibility since laws represent a process of codifying the moral values that are endorsed by society (Crane & Matten, 2004). In third place, there is economic responsibility (coeff = 2,120), which does not seem to be of a particular interest for Tunisian companies. This could be explained by the economic downturn experienced by Tunisia in recent years.

The ethical dimension of CSR comes fourth indicating the weak interest of ethics. Indeed, our sample is not subject to the constraints imposed on listed companies, which should show a certain degree of accountability to stakeholders, especially in terms of transparency of information, to establish trust (Boussourra & Zribi, 2008).

On the other hand, refining our analysis by size (Waddock & Graves, 1997; Stanwick & Stanwick, 1998) and by

sector (Waddock & Graves, 1997; Griffin & Mahon, 1997) the importance given to each of the responsibilities tends to slightly vary.

Indeed, an analysis of average trends (Boussourra & Zribi, 2008) by size and sector of activity (factor analyse method) shows that large companies (a net fixed assets of more than 4 million dinars) belonging to the industry sector lack interest in the economic dimension (third place), however they have a strong interest in legal responsibility (first place).

This may be explained by the fact that large and industrial companies (with a strong trade union presence) are controlled and subject to internal and external social pressures.

Philanthropic efforts remain very present in second position. The economic role remains low at the before last position. Business + services companies with a small size follow the same order of responsibilities found above but a slight reverse on the top where the ethical dimension goes into third position.

The order of responsibilities for Tunisian managers are represented as follows:

The social component

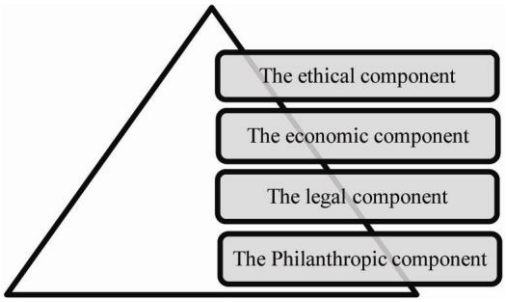


Figure 1. Social responsibility pyramid in Tunisia

The philanthropic component

According to the results, social responsibility pyramid of Tunisian companies is based on philanthropy. Indeed, this could be explained by the influence of Islamic values on corporate culture in Tunisia.

Religion teaches charity, mutual aid and collective support values to community members. Indeed, philanthropy (based on the concept of "Zaket" which is one of the five pillars of Islam) is widespread. It manifests itself in sponsorship programs, donations to various charity initiatives and financing of schools and associations (Bousourra & Zribi, 2008). In this sense, philanthropy is the right thing to do by the companies.

The legal component

The strong commitment of Tunisian companies to comply with legislation and labor code would reflect the role of trade unions and the pressure they put on companies especially since the popular uprising of late 2010. In fact, the powerful trade union center, named UGTT, gained more strength and legitimacy because of the unstable political situation in the country which allowed it to fully play its role as a defender and guarantor of the rights of workers.

On the other hand, compliance with laws relating to workers' rights by Tunisian companies could possibly be explained by the fact that they have an incentive to comply with the legal framework to attract partnerships with foreign multinationals often demanding in terms of CSR.

The ethical component

The ethical concerns do not yet seem present in the Tunisian companies. They come last. Our sample is not subject to the constraints of transparency and corporate governance practices, as is the case for listed companies (Boussourra & Zribi, 2008).

The economic component

If the economic component is a priority for companies in the US, Japan and England (Aupperle et al., 1985; Aupperle, 1982) for Tunisian companies, this dimension is far from being considered a priority. We believe that

this latter attitude may be explained by the difficult economic environment resulting from the political events that have shaken the country since the uprising of 2010. The economic slowdown and political instability reduced the attractiveness of Tunisia and discouraged domestic and foreign investors (GIZ-DP 2012).

In sum, the analysis of the Tunisian case confirms the presence of the four dimensions of CSR as theorized by Carroll (1979) and empirically proven by several studies. The results of our study are different from those in the US and European contexts.

The work of Aupperle et al. (1985) and Aupperle (1982) on the American context confirms Caroll's model (1979) putting first economic responsibility followed by legal, ethical and philanthropic responsibilities. These results have been supported by Pinkston and Caroll (1996) in a study of seven countries (USA, England, France, Germany, Switzerland, Sweden, and Japan).

In the same vein, the work of Raynaud and Roques (2007) on a sample of French companies confirms the four-dimensional nature of CSR, although the order of responsibilities does not reproduce with the order assumed by Carroll (1979).

French companies seem to mind first legal aspects and give the other responsibilities less weight.

In the Tunisian context, the results of relevant studies conducted so far seem to be controversial. Boussourra and Zribi (2008), through a quantitative study of a sample of Tunisian companies, conclude with the primacy of legal responsibility followed by ethical, economic and philanthropic responsibilities.

Furthermore, the qualitative study of Golli and Yahiaoui (2009) to determine managers' perception of the different dimensions of CSR using Carroll's model in Tunisia allowed them to extract two different conceptions of CSR by Tunisian managers. The interviews analysis found that "a first group believes that the rule of law is the very nature of corporate social responsibility and a second group believes that social responsibility primarily focuses on pursuing economic objectives.

The study of Gherib (2011) shows that in Tunisia CSR focuses on compliance and regulation. According to the author, perception of CSR in Tunisia remains minimalist or values economic objectives and the search for respecting law and regulations. The author explains this thesis by the social compromises limiting Tunisian companies due to the popular uprising of late 2010.

In sum, absence of homogeneity in results on CSR in Tunisia lets us assume that this "object of study" remains a vague and ambiguous concept in Tunisia, not yet mature enough in the culture of Tunisian companies (Gherib, 2011).

On the other hand, we believe that implementation of a CSR policy attracted several countries with a variable degree of importance and expansion, depending on the specificity of each country. This diversity in CSR conception could be explained by contextual factors such as culture or institutional variables (Boussourra & Zribi, 2008).

The cultural context is important in determining appropriate CSR priorities and programs. Campbell (2007, p. 950) assumes that corporate social responsibility "may mean different things in different places to different people at different times."

## 4. Conclusion

In this study, we sought to understand CSR as perceived by Tunisians managers using a conceptual model developed in the USA and validated in several contexts. After introducing methodological adjustments that consider contextual differences, we conducted a quantitative questionnaire-based study of a sample of Tunisian compagnies. The obtained results were different from those obtained in the US and Europe.

Indeed, our study empirically confirms the presence of the four components of CSR as theorized by Carroll (1979). Our results support therefore the current research emphasizing the four-dimensional nature of CSR (Carroll, 1979; Maignan et al., 1999). However, the Tunisian context seems clearly different from the European-American contexts insofar as in Tunisia reaching economic gains is not the first concern for Tunisian managers. Indeed, the results obtained from factor analyses allowed us to infer that philanthropic responsibility is the most influential dimension of CSR practice in Tunisia, followed by legal responsibility. Next comes successively economic and ethical responsibilities.

Our study aimed at contributing to a better understanding of the concept "CSR" which seems to be complex to define in a given context, like that of a developing country. Using a quantitative approach, rather different from previous studies which used qualitative methods, we obtained a more precise picture of CSR conception by Tunisian companies.

However, our study is not without limitations reducing thus generalization of our results.

On the one hand, and from a theoretical point of view, our study did not consider in depth the cultural and religious aspects to better explain the concept of CSR (Frederick, 1994). On the other hand, institutional power would be very important to better understand the concept "CSR" (Campbell, 2007).

Methodologically, we found it a limitation the adaptation of a CSR conceptual framework developed for the Anglo-Saxon context, which is completely different from the Tunisian context. On the other hand, we believe it would be useful to retain a larger sample to possibly generalize our results.

It would be useful to conduct further research that takes into account: (a) The parameters of the Tunisian context, as a developing country in this case; (b) The institutional aspects; (c) The presence of foreign multinationals that play a significant role in transferring principles of CSR to domestic companies (GIZ-PDD, 2012), or (d) the Arab-Muslim culture of Tunisia, which would likely influence social responsibility practices (Gherib & alii, 2009).

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# A Review of the Research on Perceived Organizational Support

Somchit Hongvichit[1]

[1] Glorious Sun School of Business and Management, Dong Hua University, Shanghai, China

Correspondence: Somchit Hongvichit, Glorious Sun School of Business and Management, Dong Hua University, Shanghai, China. Tel: 86-1376-1328-644. E-mail: somchit@163.com

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**Abstract**

To investigate relationship between perceived organizational support and organizational identification. How the interaction between perceived organizational support and organizational identification influence to employee's work attitude and behavior. Finally, put forward the dynamic changes in the development of research hypothesis of relationship between perceived organizational support and organizational identification.

**Keywords:** social exchange, social identification, perceived organizational support, organizational identification

## 1. Introduction

With the development of economy, the pressure of competition among enterprises is gradually increasing, and each organization is pursuing the maximization of interests. Enterprises are constantly asking employees to improve their working efficiency, to create more performance and value. Because of the emergence of human resource management, the new management mode is becoming more important, many research focused their research on the relationship between the employee and organization. The relationship between staff and organization is an important factor to determine the attitude and behavior of the employees (Stinglhamber et al., 2013). Van Knippenberg et al. (2007) mentioned that most of recently researches about the relationship between employee and organization are based on Social exchange theory and Identity theory. According to the social exchange theory and the principle of reciprocity, the employment relationship is a kind of trade with loyalty and hard work in exchange for material wealth and social emotional needs. And the organizational support perceived is based on the social exchange and reciprocity norms to generate (Eisenberger et al., 1986). It's important helpful to improve the relationship between enterprises and employees, improve work efficiency, positive organizational behavior once we understand how perceived organizational support influence to employee's attitude and behavior.

## 2. Literature Review

After a large number of studies, Eisenberger (1986) proposed the theory of organizational support and made the definition of perceived organizational support: The perception and attitude of employees on how the organization values their contribution and care about their interests. This includes two meanings: First, the belief of employee that the organization is paying much attention on their contributions. Second, Employees perceived organization to their care. It is these two kinds of subjective experience that constitute the perceived organizational support of the employees.

Regarding to measurement of perceived organizational support, domestic researchers and foreign researchers have different research results on the dimension (Table 1). Western researchers have been using the Perceived Organizational Support Questionnaire (POS) which developed by Eisenberger (1986), the questionnaire included 36 questions using 7 points scoring method (1 = Very disagree; 7 = Very agree). The reliability of the scale was good, Cronbach's alpha index is 0.970. Each item shows a higher load on the main factor, the correlation between each item was 0.42-0.83.

Chinese researcher Ning Yun (2010) developed perceived organizational support scale which included 10 item base on two dimension structure model of perceived organizational support. Such scale using 7 points scoring method (1 = Very disagree; 7 = Very agree). There are two sub-scale included Perceived job support with 0.779 Cronbach's coefficient and Percieved life support with 0.742 Cronbach's coefficient, the reliability coefficient of the total scale was 0.720. Each item shows a higher load on the main factor, the correlation between each item was 0.509-0.777; the reliability of the scale was good. Ling Wen Quan (2006) develop perceived organizational

support scale base on three dimension structure model of perceived organizational support, included 24 items using 6 points scoring method, reliability of sub-scale and total scale was 0.92, 0.85, 0.89, and 0.96.

Table 1. Perceived organizational support scales

| Author | Dimension | Scale entry | Scoring way | Cronbach's coefficient |
|---|---|---|---|---|
| Eisenberger (1986) | One dimension | 36 | 7 points | 0.97 |
| Ning Yun(2010) | Two dimension | 10 | 7 points | 0.72 |
| | Perceived job support | 6 | 7 points | 0.779 |
| | Perceived life support | 4 | 7 points | 0.742 |
| Ling Wen Quan(2006) | Three dimension | 24 | 6 points | 0.96 |
| | Job support | 10 | 6 points | 0.92 |
| | Employee value recognition | 7 | 6 points | 0.85 |
| | Benefits interest | 7 | 6 points | 0.89 |

## 3. Method

### *3.1 Theoretical Basis*

Perceived organizational support is the important variable to discuss the relationship between organization and employees, it explains how the relationship between employees and organization affects to work attitude and behavior of employees from the perspective of social exchange theory. The studies of perceived organizational support are based on social exchange theory, reciprocal specification and organization anthropomorphic thinking. Social exchange theory thinks that the employment relationship is a kind of trade that uses hard and loyalty to exchange for the actual benefit and social rewards. The relationship between the employee and the organization is based on the transaction. The evaluation of the quality of the exchange relationship between employees and the organization can predict the attitude and behavior of employees. The better exchange relationships (got more organization support), employees will pay more attention to the organization's interests and stay in the organization. This is because specification reciprocal gives employees a sense of obligation, motivate employees return their organization, then perceived organizational support can affect the organizational commitment, performance, job satisfaction and the role of external behavior...etc. If employee is not satisfied with the exchange relationship, think that their pay out is not equal to return, may cause employee want to break off the relationship with organization, work withdraw behavior such as absenteeism, late and not active working. Levinson (1965) mentioned that employees will think that the behavior of organization agent is the behavior of the organization itself. In this way, if employees are under good treatment of leadership, it will naturally think that organization is care and pay attention on them, perceived organizational support will be generated.

### *3.2 Antecedent Variables*

Rhoades and Eisenberger (2002) analysis of a large amount of literature data and research, found that fairness, superior support, organizational rewards and working conditions are the main factors impact to perceived organizational support. Among them, the positive correlation between fairness and perceived organizational support is the strongest, followed by the superior support and reward/working conditions. Procedural fairness as a component of equity and POS has a strong relationship. Shore et al. (1995) mentioned that perceived organizational support was generated from constantly feeling of procedural justice such as salary growth and promotion policy evaluation. Employees will organize anthropomorphic, the way the superior's behavior and the way they treat employees represents the organization's approach. If the employees get a favorable treatment from the superior, they will take this superior's support as an organization to give them support. Shanock and Eisenberger (2006) research indicates that perceived organizational support has a positive relationship with superior's support and internal/external behavior. Therefore, this kind of support from the superior behavior will deeply affect the perceived organizational support. In the practice of human resource, the recognition of the contribution of employee is positively related to perceived organizational support. The relationship between perceived organizational support and rewards/work condition is weak. Rhoades and Eisenberger (2002) in their study pointed out that in the part analysis, there is separate contact between rewards/work condition and perceived organizational support after control both justice and superior's support only.

### *3.3 Outcome Variable*

Perceived organizational support can effectively predict affective commitment, job satisfaction, willingness to stay in the organization and turnover intention. Perceived organizational support has an intermediary role on

work input, work stress, withdrawal behavior and external role behavior. Shore et al. (1991) through empirical research found the relationship between perceived organizational support, organizational commitment and job satisfaction. The research shows that perceived organizational support and organizational commitment are two different concepts but there is a close relationship between them and it is a positive relationship. Shore and Wayne (1993) found that affective commitment is negatively related to both of them; In addition, perceived organizational support is a better predictor of organizational citizenship behavior than affective commitment and continuance commitment. Eisenberger (1986) research pointed out that the higher level of perceived organizational support lead employees produce a sense of identity that they are one of important member of the organization, thus it can effectively reduce the occupation flow and turnover behavior. Arokiasamy (2010) indicated that there were significant correlation between job satisfaction, affective commitment, turnover intention and perceived organizational support. Beheshtifar (2012) studies also showed that there was a significant correlation of perceived organizational support and employee positive attitude.

## 4. Result and Discussion

Perceived organizational support and organizational identification can predict the relationship between employees and organizations. In recent years, many researchers have carried out in-depth and detailed discussion from both angles. Perceived organizational support and organizational identification are separately on behalf of the social exchange and social identity process, having different antecedent variables. These two perspectives are often independent of each other, but they cannot rule out the possibility of interaction in the influence of organizational behavior. Van khippenberg (2007) study pointed out that there is interactive effect between perceived organizational support and organizational identification in the process of turnover behaviors prediction (turnover intention, absence from duty). Omer Turung and Mazlum Celik (2010) study showed that there was significant effect of perceived organizational support on organizational identification, and organizational identification played an intermediary role in the effect of perceived organizational support on turnover intention. Shen Yi Mo (2007) study showed, perceived organizational support has directly significant effects on organizational identification and turnover intention. At the same time, perceived organizational support indirect effects employees' intention to stay, colleagues altruistic behavior, individual initiative, interpersonal harmony and protection of the corporate resources through organizational identification. Previous studies have pointed out that perceived organizational support has an impact on organizational identification, then can perceived organizational support contribute to identification organizational? Van Knippenberg (2007) pointed out that the perceived organizational support is derived from the evaluation of the exchange relationship. Fairness and rewards related to the positive evaluation of exchange relationship, and the organizational identification is derived from perception of the similarity between the employees and the organization. Organizational identification can be enhanced if the organization has a good attraction, a good exchange relationship (high perceived organizational support) may contribute to the organization attraction, thereby increasing organizational identification.

On the other hand, although the interaction between perceived organizational support and organization identification has been confirmed can impact on employee attitude and behaviors, but this effect is not significant under any conditions. Van Knippenberg (2007) study pointed out that the interaction of perceived organizational support and organizational identification effect to the relationship between turnover intention and absence from duty has significant negative correlation, but this correlation is valid only for those low organizational identification. For those high organizational identification, this correlation is low or not significant. Similarly, Stinglhamber et al. (2013) research also shows that when the organizational identification is low, improve perceived organizational support can reduce the possibility of employee to join the labour union. When the organizational identification is high, perceived organizational support is not significant to the possibility of employee to join the labour union. That is mean; the relationship between perceived organizational support and employee working attitude and behavior can be weaken by strong organizational identification, even neutralization. The possible reason is analyzed in the study of Van Knippenberg (2007), they argue that the social exchange process means that the relationship between the individual and the organization is two separate entities, but the identification means both are one. Therefore, high organizational identification will lead to low fewer individuals evaluation the relationship with organizational through exchange quality. Even low quality exchange relationship, high organizational identification may also be less willing to shrink from the organization, because they would go against their own self consistency with the organization.

Perceived organizational support and organizational identification can influence the attitude and behavior of employees, their interaction can also have an impact, but the impact of interaction is not significant for the individual with high organizational identification. From a vertical perspective, it is suggested that a new

employee who enters the organization can enhance the organizational attraction, thereby enhancing the organization identification, influence on the work attitude and behavior, but with the extension of time, the organizational identification of employees is the dominant influence on the work attitude and behavior, and the effect of perceived organizational support is gradually weakened.

## 5. Limitation and Prospect

In this paper, we introduce common variables in the study of relationship between employees and organization with the literature material (concept and measurement method of perceived organizational support), sort out the research on its theoretical basis, the antecedent variables and outcome variables. Also discussed the influence of perceived organization support and organizational identification on the attitude and behavior of employees, interaction between them and made the hypothesis the dynamic changes of perceived organizational support and organizational identification of the new employee.

Main limitations of research in perceived organizational support and organizational identification is the lack of longitudinal study of changes in the relationship between perceived organizational support and organizational identification. Therefore, also inspect of the causal relationship between them. The research hypothesis proposed in this paper can provide a possible direction for future research, which makes the empirical research of perceived organizational support and organizational identification have the opportunity to enrich.

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