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A MESSAGE FROM THE CO-EDITORS

It is with great pleasure that we welcome you to this issue of the *Journal of International Business Research*, the journal of the Academy for the Study of International Business, an affiliate of Allied Academies, whose mission is to support the exchange of ideas and insights in International Business.

This issue features the best papers among those presented at the ICBEIT 2011 Guam International Conference on Business, Economics and Information Technology on the theme of "Doing Business in the Global Economy: Economic, Political, Social, Cultural and Technological Environments Facing Business". Founded on a very simple idea, that there is so much we can learn from each other, the above conference provided an opportunity for academicians, researchers, students, and representatives from industry and government to get together and exchange ideas in the spirit of scholarship and professional growth.

We thank the University of Guam's School of Business and Public Administration and Penn State Altoona's Division of Business and Engineering for their support of the publication of this journal issue. We also acknowledge the members of Allied Academies' Editorial Review Board for their collegiality and service to our profession. Additionally, we are grateful to the Academy for providing us with the outlet through which we can share our scholarly efforts with those interested in the study of International Business.

Consistent with the editorial practice of the Academy on all 18 journals it publishes, each paper in this issue has undergone a double-blind, peer-review process.

This issue includes papers by authors from Indonesia, Japan, Korea, Philippines, Vietnam, Continental U.S. and the Island of Guam, thus reflecting the international reach of Allied Academies and the diversity of its membership.

Information about the Allied Academies, the *JIBR*, and the other journals published by the Academy, as well as calls for conferences, are published on our website. In addition, we keep the website updated with the latest activities of the organization. Please visit our site and know that we welcome hearing from you at any time.

From the Co-editors,

Dr. Maria Claret M. Ruane, University of Guam

Dr. Barbara A. Wiens-Tuers, Pennsylvania State University-Altoona

CONGRUENCY BETWEEN THE PROJECTED AND PERCEIVED TOURISM DESTINATION IMAGE OF VIETNAM

Thi Lan Huong Bui, CFVG, University of Economics of HCMC

ABSTRACT

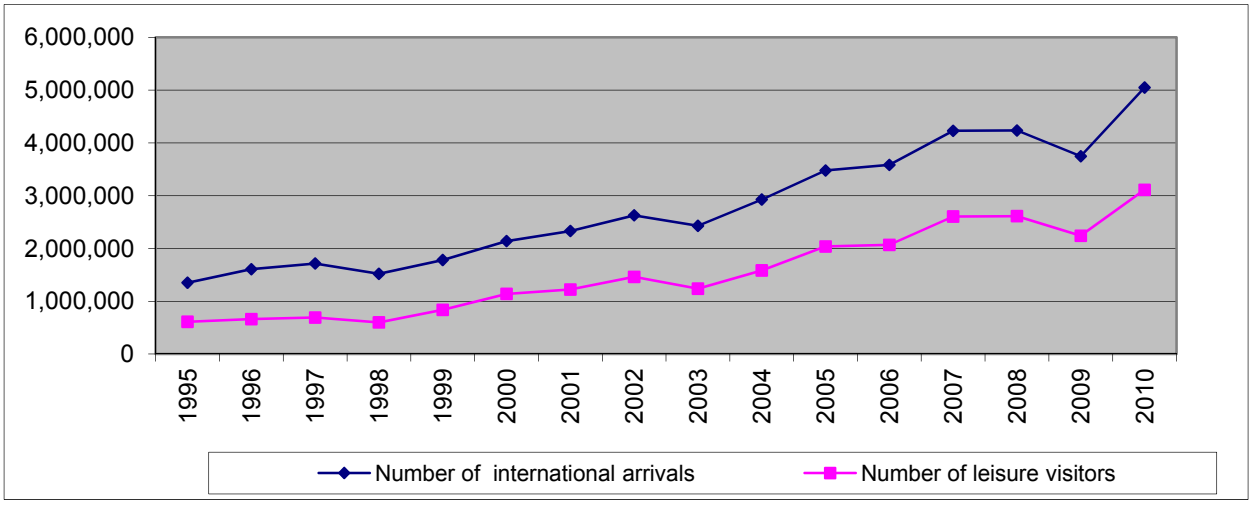
Since the last decade, the tourism industry has given great opportunities to emerging markets like Vietnam to grow remarkably. Vietnam has been still an attractive tourism destination for Chinese, Japanese, Korean, European and American visitors, even during the global economic crisis period. Signs of recovery are observed with an increase of the number of foreign visitors by 34.8% (more than 5 million visitors) in 2010 in comparison with the figures shown in 2009. However, the country has been facing competition from its ASEAN neighboring countries such as Singapore, Malaysia, Thailand and Indonesia which have developed a strong tourism destination image for years. This research work explores the destination image attributes perceived by foreign visitors on one hand and examines the government's projected image of Vietnam on the other hand. The qualitative study on the level of congruence between destination image projected by the tourism public sector and the image perceived by international tourists will help Vietnam as a tourism destination attract more and more visitors in order to improve significantly tourism growth as supported by the literature about destination image (Cai, 2002; Koerte, 2009; Le, Cooper, 2009).

INTRODUCTION

Since the early 1990s, Vietnam has experienced a new start of tourism development. The country has been gradually building up its destination image and witnessing growing popularity of tourism attraction. Recently, the quick economic recovery in Vietnam with annual economic growth rate of 6.78% in 2010 against 5.30% in 2009 has been also the key driver for boosting a new wave of international arrivals. In 2010, Vietnam hosted more than 3 million international tourists out of 5 million arrivals, a good sign for the tourism industry after the global recession (Figure 1). It generates a turnover of VND billion 96, 000 (equivalent to USD billion 4).

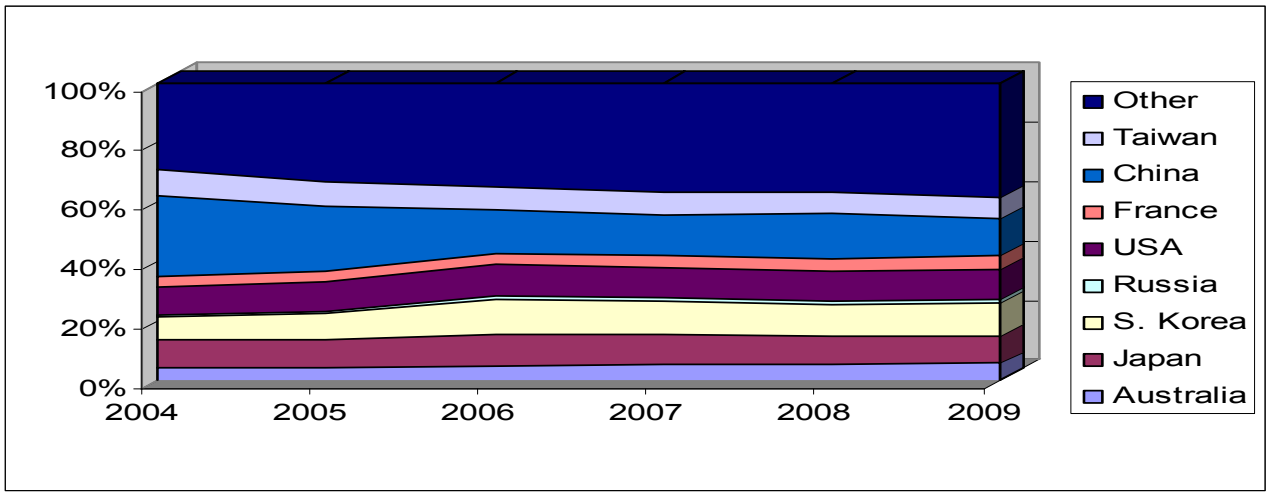
Relied on potential resources and experiences of the tourism industry, the Vietnamese authorities plan optimistically to host 7-8 million international tourists and to generate around USD billion 10, contributing to 5.5%-6% to GDP in 2015. Its key traditional inbound markets are Asian, especially Chinese, Korean, and Japanese, Australian, American and European. Recently, Russian tourists emerge as very potential markets for Vietnam (Figure 2).

Figure 1: Evolution of the number of international arrivals and leisure visitors (1995-2010)



Source: GSO, 2011

Figure 2: Composition of international markets by country



Source: Euromonitor, 2010.

Despite of increasing popularity of Vietnam as a tourist destination, the country has been facing fierce competition from its ASEAN neighboring markets such as Singapore, Malaysia, Thailand and Indonesia which have developed their strong tourism destination image for years. Therefore, in order to attain its tourism five-year plan objective, Vietnam need to build a strong destination image compared with its Asian competitors that influences on destination decision making of international visitors (Crompton, 1979; Echtner, Ritchie, 1993; Buhalis, 2000; Freire,

2002; Hall, 2002; Kotler, Gertrude, 2002; Lodge, 2002; Pike, 2008; Frochot, Kreziak, 2008; Le, Cooper, 2009). As a destination image is composed of the perceived and projected image, incongruities between the perceived and projected image might weaken marketing efforts of destination marketers to target and position markets (Cai, 2002).

This paper aims to identify relevant destination image attributes of Vietnam, both on the visitors' perspective and on the government's perspective. It also analyzes the level of congruency between the projected and perceived tourism destination image of Vietnam. The congruency of destination image anticipated by the tourism public sector with the image perceived by tourists will help Vietnam as a tourism destination attract more and more visitors in order to improve significantly tourism growth as supported by the literature about destination image (Cai, 2002, Koerte, 2009; Prebezac, Mikulic, 2009; Le, Cooper, 2009).

RESEARCH ON TOURIST DESTINATION IMAGE

Conceptualization of tourism destination image

Concepts

Destination image is defined generally a sum of beliefs, ideas and impressions that people have of a particular tourism destination (Crompton, 1979). In details, it includes perceptions or impressions of a place (Phelps, 1984, reviewed by San Martin, Rodriguez del Bosque, 2008) or an individual's mental representation of knowledge, feelings, and global impression about a destination (Baglolu, McCleary, 1999a). Despite the popularity of the concept, its exact meaning seems "subjective" (Bigné, Sánchez, Sánchez, 2001), "vague" , and depends on a variety of context, including those pertaining to the destination images projected by the government or perceived by tourists (Echtner, Richie, 1991; Jenkins, 1999). To make the definition of the destination image less abstract, Echtner and Ritchie (1994) conceptualize the destination image construct by distinguishing the two distinct dimensions of a destination image: attributes based and holistic. Each of these two dimensions consists of functional (or more tangible) and psychological (or more abstract) characteristics and images may range from those based on common characteristics to those based on more distinctive or unique characteristics. At this regard, the destination image construct is quite rich because it uncovers multi-components. Indeed, it is commonly viewed as a compound of various dimensions that enhance destination attractiveness for potential tourists (Mackay, Fesenrhasier, 1997; Freire. 2002; Blain et al, 2005).

Components and formation of destination image

The conceptualization of destination image also concentrates on three components: affective, cognitive, and conative, which have a hierarchical relation. The cognitive component

includes knowledge and beliefs of destination attributes. Affective component is related to how the person values destination, or what does he/she feel about it. After the formation of affective and perceptual components, the conative component is happening, or the travel decision is made (Crompton, 1979; Echtner, Ritchie, 1993; Freire, 2002). Understanding the formation process will help destination marketers design effective destination branding strategy. The formation of image is influenced by the characteristics of a destination, exposition to information received about that destination (Baloglu, 1997) and personal factors such as motivations and social demographic characteristics (Baloglu, 1999, Crompton, 1979). Following these previous models, Beerli and Martin (2004) proposed a similar conceptual model of the formation of destination image where the perceived destination image composed of cognitive and affective images forming the overall image is influenced by the two main factors, information sources and personal factors. The information sources might be secondary such as induced, organic and autonomous or primary such as motivation, traveling experience and socio-demographic variables.

In short, the essence of destination image studies is to discover how people visualize, think, and feel toward places. The perception of tourism destination image through attributes can influence tourists' destination choice (Goodrich, 1978; Gartner, 1986; Hunt, 1995; Jenkin, 1999). It also plays also an important role in the formation of satisfaction of travelers (Buhalis, 2000; Pike, 2008). Interestingly, due to the multi-dimensional and dynamic nature of destination image (Kotler, Gertner, 2002; Freire, 2002), researchers should analyze the composite image in the context of a specific place and a specific period of time. In addition, the image perceived by visitors might not be necessarily similar to that projected by the government or anticipated by destination marketers, and "no two people see a destination in exactly the same way" (Dann, 1996). Beside, the relationship of tourists' perception of a destination attributes and their destination selection might be reinforced by the importance of some important attributes as some destination attributes may play a more important role than others (Swarbrooke, 1999). Therefore, while investigating image of a destination, researchers should focus not only on a particular place and point of time, but also on specific segments of population.

MEASUREMENT OF DESTINATION IMAGE

The relationship of tourists' perception of a destination attributes and their destination selection might be reinforced by the importance of some important attributes as some destination attributes may play a more important role than others (Swarbrooke, 1999). Therefore, it is important for tourism researchers to identify and measure destination image by capturing destination image core components.

Attributes components captured

As an image of a destination is defined as a set of attributes, most of research works focus on the attribute component of destination image. Echtner and Ritchie (1991, 1993) suggested an empirical research framework where components captured are composed of attribute-based images, holistic impressions, and functional, psychological, unique, and common characteristics.

Methods used

The measurement of tourism destination image has been important for both researchers and practitioners. An accurate assessment of image helps destination marketers design an effective marketing strategy (Reilly, 1990, reviewed by Baloglu, Mangaloglu, 2001). To measure comprehensively a destination image, researchers did apply structured or unstructured measurement approaches. Structured approaches include semantic differential scales or Likert scale format to evaluate the cognitive (natural beauty, friendly people, value for money, weather, nightlife, entertainment,…) and affective components (Exciting atmosphere, romance,…) of a tourism destination image (Goodrrich, 1978; Haahti, 1986; Gartner, 1989; Bagloly, Brinberg, 1997; Jenkins, 1999; Hankinson, 2004). Because this method usually requires respondents to evaluate a set of pre-determined attributes subjectively, it might be relatively unreliable (Timmermans et al, 1982, cited by Jenkins, 1999). Meanwhile, unstructured techniques explore the richness of image that measuring image by pre-identification of attributes fails to capture it (Gallara, Saura, 2002, reviewed by Zhou, 2005). However, few research works have used consumers to identify attributes relevant to a destination image. Therefore, a combination of an exploratory qualitative study and a validation of the results seems the most useful method to investigate a tourism destination image. To investigate the projected and perceived image of Mexico, Crompton (1979) applied content analysis of written information (reading material, travel brochures) and unstructured interviews with 36 students to identify the attributes of Mexico. Particularly, content analysis of both written and visual information such as brochures, photos, movies) is an effective method to study the images projected by the public and private tourism organizations. For instance, Dilley (1986), reviewed by Jenkins (1999) used this method to reveal the destination images projected by different national tourist organizations to the North American market. Content analysis is also used in focus groups or in-depth interviews where respondents discusses their image of a destination were taped and transcribed, and then, the important dimensions, constructs or attributes are extracted (Jenkins, 1999).

The quantitative study will validate the qualitative findings. Echtner and Ritchie (1991, 1993) suggested an empirical research framework where components captured are composed of attribute-based images, holistic impressions, and functional, psychological, unique, and common characteristics. They propose a combination of structured and unstructured methodologies to measure the destination image.

IDENTIFICATION OF TOURISM DESTINATION IMAGE ATTRIBUTES OF VIETNAM

In the empirical tourism literature, researchers usually proposed a set of attributes to identify the image of a particular destination. In his review of literature on tourism destination image attributes, Zhou (2005) listed 16 attributes which were frequently used from 28 previous studies for different destinations during the period 1986 to 2005 namely: (1) *Culture, history*, (2) *Landscape*, (3) *Services (shopping, accommodation, food, and transportation),* (4) *Entertainment*, (5) *Relaxation*, (6) *Climate (pleasant weather,…),* (7) *Price (cost, value for money),* (8) *Sport,* (9) *Safety (personal safety),* (10) *Local people's attitude toward visitors,* (11) *Special events and activities*, (12) *Accessibility (information available),* (13) *Adventure,* (14) *Wildlife,* (15) *Close to other destinations*, (16) *Special animals*. Zhou also pointed out that among them the most frequently used attributes are: Price, Culture and history, Entertainment, Relaxation, Landscape, Climate, Safety, Accessibility, Local people attitudes toward tourists, Special events and activities, Adventure, and Tourism services. However, these frequently used attributes must be analyzed with reserve because not all tourism destinations share the same core attributes and visitors might see a destination in their own perception. Therefore, the country specificities must be taken into consideration.

Table 1: An initial literature-based list of tourism destination image attributes for Vietnam

No.	Destination image attributes of Vietnam		
1	Cheap purchases	12	Friendly people
2	Exotic food, delicious cuisine	13	New experience
3	Interesting local ways of life, rich culture	14	Convenience
4	Historical places, world heritage sites, beautiful architectural buildings	15	Cleanliness
5	Beautiful landscapes and beaches	16	Relaxing atmosphere
6	Cultural festivals and events	17	Safety, security
7	Souvenirs, handicrafts items	18	Political stability
8	History	19	Good climate
9	Tourism services quality	20	Adventure
10	Tourism infrastructure	21	Accessibility (information available)
11	Entertainment	22	Close to other destinations

In the case of Vietnam, relevant destination image attributes for Vietnam might not be the same as studied in previous research works. Based on the empirical tourism literature in Asia and

specifically in Vietnam, we incorporate 9 new attributes which were additionally identified: (17) *Cleanliness,* (18) *Political stability*, (19) *New experience* (20) *Tourism infrastructure,* (21) *World heritage sites*, (22) *Souvenirs, handicrafts*, (23) *Convenience,* (24) *Exotic food*, (25) *Interesting local ways of life* (Tapachai, Waryszak, 2000; Nguyen, 2008; Le, Cooper, 2009; Bui, Perez, 2010; Asia-Pacific Travel Intentions Survey, 2010, conducted by Visa and the Pacific-Asia Association (PATA)). However, among the 25 attributes identified especially for Vietnam, we discard 3 attributes namely Sport, Wildlife, and Special animals that seem less relevant to Vietnam tourism specificities. Thus, we propose an initial list of 22 tourism destination image attributes from tangible attributes (from attributes 1 to 8) to less tangible or psychological attributes (from attributes 9 to 22) in Table 1.

PROJECTED VERSUS PERCEIVED TOURISM DESTINATION IMAGE OF VIETNAM: AN EMPIRICAL STUDY

Research methodology

Based on our initial literature-based list of attributes, we design an empirical research to examine how international tourists perceive the image of Vietnam as a tourism destination. The identification of attributes perceived by tourists will allow us to confront with our above literature-based list of attributes selected for Vietnam so as to adjust our list of attributes suitable to the tourists' perspective.

Besides, aiming to explore projected and perceived destination image, unstructured method which does not use any form of descriptions to measure destination image (Boivin, 1986, cited by Rashid and Ismail, 2008) is chosen because it facilitates to capture the most relevant destination image attributes. The investigation of congruency between the projected and perceived image will be processed in three steps as follows:

Step 1: Exploring the perceived image.

Identifying destination image attributes of Vietnam perceived by international visitors by conducting an exploratory study with in-depth interviews with an interview guideline. Respondents were asked to talk firstly about their perception about the image of Vietnam before visiting the country. Then, they talked freely about their travel experience, and especially their perception about attributes forming destination image. The sample is composed of 43 foreign tourists coming to Vietnam during the period of June 2010-March 2011 (in which 8 are repeat travelers) at different tourist sites such as Halong Bay, Hanoi, HCMC Da Lat, Nha Trang, Mekong Delta, and Mui Ne. Interviewees were chosen among key target segments in Vietnam: American (7), Russian (12), Japanese (5), Italian (3), Spanish (4), English (2), French (5), and Australian (5). All of them come from the upper middle income class of different categories of

profession, from entrepreneurs to employees. The selection of various markets in our study is explained by the diversity of Vietnamese structure of international tourists because in our preliminary study about destination image we tempt to explore the general perception of international tourists on the tourism image of Vietnam before moving forward to segmenting the Vietnamese inbound tourism market as the literature suggests.

Step 2: Exploring the projected image by the Vietnamese government.

To determine the image projected by the Vietnamese authorities, we use a content analysis on Vietnam's National Administration Tourism website and promotion tools such as advertising in the mass media and other marketing efforts to promote the image of Vietnam by the tourism public sector. In addition, to collect primary data about the projected mage by the tourism private sector, we also conduct in-depth interviews with 5 big tour agencies operating in Vietnam to analyze the image of Vietnam that they want to project. The choice of tour operators and travel agents in the destination selection process is explained by the fact that these agents serve as both distribution channels and image creators (Reimer, 1990). Our content analysis of verbal, written, and visual information is justified by research works reviewed by Jenkins (1999) to analyze the projected destination image. Koerte (2009) also applied by this method to study core attributes projected by the tourism public and private sector in Tanzania such as *Natural environment*, *Culture, Marketing, Business, Transportations, Accommodation, Travel information, Activities, Wildlife,* and *Attractions*.

Step 3: Congruency analysis of projected image by the Vietnamese authorities and perceived image by foreign visitors.

The level of congruency between the projected and perceived image will be assessed after confronting core attributes captured from this empirical study.

Findings: Perceived versus projected tourism destination image of Vietnam

Our qualitative research indicates that our 22 proposed attributes from the existing tourism literature seem to match perfectly with those perceived positively or negatively by our respondents. Interestingly, 4 more attributes are added, namely (23) *Memories, nostalgia and colonial charm,* (24) G*reen, environment protection, (25) Economic development, (26) Freshness of products, healthy eating habits* from foreign visitor. Indeed, they were really amazed with the Vietnamese consumption of fresh produce and healthy eating habits (a well-balance of protein, carbohydrates, and vegetables). More importantly, experiencing a couple of days in busy cities like Hanoi and Hochiminh city had changed their image of Vietnam as a quiet and still poor country after the war. Thus, *Economic development* seems also a core attribute

contributing to the image of Vietnam. Otherwise, friendly attitudes of residents toward foreign tourists, cheap purchase, exotic food, souvenirs, traditional artworks, natural beauty, rich culture, diverse ethnic groups, long history and colonial charm are positively perceived by most of respondents. Delicious cuisine, restful feelings, good weather with eternal sunshine, freshness of produce, new experience, and friendly people are particularly highlighted by all of international tourists. For instance, *good food* such as Pho noodles (Vietnamese beef or chicken noodle), spring rolls, fresh sea food, regional specialties, tropical fruit has been always an interesting attribute along with *History* linked to the war memories from travelers' relatives, *Convenience* viewed by most of respondents as the abundant availability of fruit and food every corner. *Exciting life* that means for them overcoming fears to go across busy streets in the heart of motorbike cities, socializing in traditional markets by bargaining, *Entertainment* at Vinperland close to the beach in Nha Trang, fun when attending different local festivals, and *New experience* when riding motorbikes have amazed international visitors.

In contrast, *Poor tourism infrastructure, Unsecured feeling when going across the streets, and traffic accidents, Bad environment protection* have been causing a negative image of Vietnam as a tourism destination.

Interestingly, regarding the image projected, among 26 attributes perceived by international travelers interviewed, only 18 attributes have been projected by both Vietnamese authorities and tourism agencies (Table 2).

Results of our study suggest that basically the destination image components projected by the Vietnamese authorities, in particular functional and emotional attributes such as *Price, Natural beauty, Safety, Friendly people, Relaxing atmosphere, New experience, Culture and history, Festivals and cultural events, Exotic food, Good climate, Tourism services, Adventure, Entertainment* and *Political stability* have been perceived by international tourists. The "hidden charm" to discover, "unpredictable" trip experience by questioning "What next?" (TV commercial broadcasted in CNN during December 2010) in "Vietnam, your destination" promoted by the Vietnamese public tourism industry have been effectively helping travelers to connect the place with their experience.

In addition, in order targeting North American and European tourists, tour operators also use emotional attributes such as *Memories linked to the Vietnam war, Nostalgia, colonial charm* with French colonial architectural motifs of buildings, houses and churches to enhance the image of Vietnam. Nevertheless, the 7 other destination image attributes that seem important for tourists to evaluate their satisfaction such as *Tourism infrastructure, Convenience, Green and environment protection, Cleanliness, Close to other destinations, Memories, nostalgia and colonial charm, and Healthy eating* have not been projected by the Vietnamese government. Surprisingly, while natural beauty, friendly people, political stability and diversity of culture are strongly projected by tour operators and the government, the attribute that seems very important for international tourists, and especially for Vietnam to promote a new image of the country with

Rapid economic development has not been highlighted by the Vietnamese tourism public and private sector.

Table 2: Perceived versus projected tourism destination image of Vietnam

No.	Literature-based	Perceived	Projected
1	Cheap purchases	X	X
2	Exotic food, delicious cuisine	X	X
3	Interesting local ways of life, rich culture	X	X
4	Historical places, world heritage sites, beautiful architectural buildings	X	X
5	Beautiful landscapes and beaches	X	X
6	Cultural festivals and events	X	X
7	Souvenirs, handicrafts items	X	X
8	History	X	X
9	Tourism services quality	X	X
10	Tourism infrastructure	X (-)*	
11	Entertainment	X	X
12	Friendly people	X	X
13	New, authentic experience	X	X
14	Convenience	X	
15	Cleanliness	X	
16	Relaxing atmosphere	X	X
17	Personal safety, security (in the streets)	X (-)*	X
18	Political stability, peace	X	X
19	Good climate	X	X
20	Adventure	X	X
21	Accessibility (information available)	X	X
22	Close to other destinations	X	
23		Memories, nostalgia, colonial charm	X (Tourist agents)
24		Green, environment protection; (-)*	
25		Economic development	
26		Freshness of products, healthy eating habits	

Note: (-)*: these attributes are negatively perceived by respondents

MANAGERIAL IMPLICATIONS AND FUTURE RESEARCH

Our research points out that there is a relative level of congruency between the projected and perceived image of Vietnam as a tourism destination. However, the major dissonance between the projected and perceived image is the view of the quality of tourism infrastructure, convenience, cleanliness, and tourism environment protection that might undermine the tourism destination image of Vietnam as the tourism literature taught. In this sense, the public and private tourism sector in Vietnam has to take aggressive destination marketing actions focusing on improving the positive image of Vietnam while these attributes contribute to the sustainable tourism development.

The construction of Vietnam as a tourism destination anticipated by the tourism industry has long been as a country of natural beauty, a nation of peace loving with long history and

smiling people. Meanwhile, the success of Vietnam's gradual industrialization efforts since its liberalization to international trade and investment leading to unprecedented high economic growth sustained for a long period has not been projected even though *Economic development* is positively perceived by most of foreign tourists. In order to create a new image of Vietnam as a tourism destination, this attribute seems one of the most relevant to attract foreign visitors.

As a tourism destination image is perceived differently by different markets, segmentation of the inbound market might be effective to enhance travelers' satisfaction and hence increase loyalty.

Due to the quasi-nonexistent of research on the congruency of projected and perceived tourism destination image of Vietnam, we propose to validate to our exploratory research to a comprehensive quantitative research while refining our study with a particular tourist attraction and a particular tourist segment for future research.

CONCLUSION

While Vietnam has been gaining popularity as an attractive tourism destination, there is a lack of research on its destination image that plays an important role to influence tourists' decision making to visit Vietnam. More importantly, tourism development depends strongly on the degree of congruency between the projected and perceived image. By exploring the perception of international tourists toward Vietnam as a tourism destination, we find out that international tourists seem very sensitive to personal safety, hygiene and health care, environmental issues as well as economic path of a country they decide to visit. Unfortunately, these components have not been anticipated by the tourism industry. The results of this research will help destination marketers from both public and private sectors to be aware of the structure of destination image and to identify the relevant core destination image attributes so as to take actions on building a strong the tourism destination image of Vietnam.

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DO MARKETS CARE ABOUT SOCIAL AND ENVIRONMENTAL PERFORMANCE? EVIDENCE FROM THE TOKYO STOCK EXCHANGE

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ABSTRACT

Japan's environmental accounting and reporting has been in practice for over a decade now, as facilitated by the Ministry of Environment guidelines. Sustainability's triple bottom-line, however, is seen not from a balanced perspective but with a strong focus on environmental conservation over social performance. Sustainability reports show genuine environmental philosophies while social concerns appear to have been designated as mainly a function of the government.

In this paper, I review the sustainability and annual financial reports of the top 20 actively traded manufacturing companies in the Tokyo Stock Exchange and aim to establish if there is any impact of social and environmental performance over financial performance. By using panel data from 2004 to 2009, I collectively regress social and environmental costs with measures of market and financial performance.

Following literature on virtuous cycles, I alternatively explore if it exists for Japan's top listed companies. The expectations of my study point to the insignificance of social performance as observed in the Japanese business environment while having a predominant concern for the natural environment. Consistent with literature on the link of Corporate Social Performance (CSP) with financial performance, my findings support the perspectives of resource-based view and the slack availability of resources.

INTRODUCTION

Japan, together with the U.K. and Germany, was highlighted by Kolk (2003) as practicing advanced sustainability reporting through government facilitation. As early as the turn of the century, the private manufacturing sector, the academe and other stakeholders coordinated with the Ministry of Environment (MOE) in drafting the guidelines for environmental accounting and reporting.

A decade after, the MOE has observed increasing compliance particularly from publicly listed companies, on reporting environmental conservations costs which are classified either as maintenance costs or investments.

Over the years, scholars have been searching for ways to operationalize sustainability performance from its root construct of CSR and CSP. Japanese companies are particularly

interesting to examine because of the availability of data which spans from 2000 to 2010, with varying levels of adoption from automotives, electronics, and diversified companies, heavy industries, pharmaceuticals, and chemicals manufacturing and utilities companies.

My study explores if there is any positive relationship between environmental innovations and market and firm financial performance, following the resource-based view perspective. Environmental innovations are measured in terms of environmental accounting costs shown in the sustainability reports. Market performance is operationalized as to high stock market price in a year and book value per share. Firm financial performance in this study refers to measures of revenue, profitability, firm size, leverage, and equity. I explore further if the relationship between these constructs is bi-directional as earlier espoused by CSP scholars. Advocates of the slack availability of resources suggest that social and environmental performance is facilitated by the availability of financial resources (Ullman 1985). These perspectives, however, are not mutually exclusive and could be combined in what I call the accumulated slack theory (Cortez 2010). The two-way direction of relationships affects both the accumulated tangible and intangible benefits over time realized by management, from social and environmental innovations.

LITERATURE REVIEW

Deloitte Touche Tohmatsu, a leading global accounting firm, published *The Sustainable Auto Report* in 2001 highlighting the strengths and weaknesses of sustainability reporting practices. While there is genuine environmental concerns in the corporate philosophy of automotive manufacturers with detailed discussions on product life cycles, innovation, technological options and eco-efficiency, there seems to have been limited discussions on matters that have or could have a bearing both on risks and opportunities, and on short- and long-term financial performance. More than half the reports evaluated in the study scored low (0 or 1) in the description of financial implications of environmental or social issues.

Kokubu & Nashioka (2002) covered the years 1998 to 2000, in a survey of environmental accounting practices of listed companies in Japan. They view environmental accounting as more likely restricted to the calculation of environmental conservation cost, but the range could be expanded into environmental conservation as well as corporate management (Kokubu & Nashioka, 2002). They criticize the current practice and see the comparability of these costs amongst companies as not so reliable yet, because companies conforming to the guidelines are left with much discretion in recognizing and reporting environmental costs. The problems in defining environmental costs could stem from the lack of standard definition, distorted calculations, access to information, hidden costs and cost internalization (Jasch, 2002).

The comparison of environmental costs and financial figures such as sales is probably helpful in seeing trends in companies' environmental conservation activities. The benefits of environmental accounting includes: improvement of corporate image while enhancing

consciousness within the company; reduction of environmental burden; reduction of environmental costs; development of environmentally friendly products; and the improvement of environmental decision-making (Kokubu & Nashioka, 2002). These are all consistent with Orlitzky's (2008) theorization of the benefits of environmental accounting.

Kokubu & Nashioka (2002) correlate environmental costs with sales, net income and assets but had to consider only the business area costs, upstream and downstream costs, and management activity costs. They saw the ambiguity of R&D costs, social activity costs and environmental damage costs in making the total environmental costs comparable. Using Spearman's correlation coefficient analysis, they concluded that there is positive correlation with non-consolidated data and strongly positive correlation for consolidated data. They suggested further studies, considering that in 2002 standardization was in place, and expected widespread compliance amongst Japanese companies. Meanwhile, their study revealed certain differences in environmental accounting practices according to company size and industrial sector.

Environmental performance having a two-way positive impact on financial performance on Japanese companies has been examined statistically by Nakao, Amano, Matsumura, Genba and Nakano (2007). They used the environmental performance score by the Nikkei Environmental Management Survey as the variable controlled by the rate of increase in revenues, R&D expenses to sales ratio, sales to total assets ratio, and financial leverage. They suggest that the phenomenon of virtuous cycles is fairly recent as other scholars caution that it may not hold for a longitudinal basis.

METHODOLOGY

Panel data regression analysis is performed on 20 out of 50 top actively traded companies in the Tokyo Stock Exchange comprising automotive, diversified, electronics, and heavy industries. It is notable that half the 50 companies are in the manufacturing sector, and the companies in my study compose the significant big players. Fixed effects and firm specific factors are captured in the panel data regression for the period 2004 to 2009. Environmental accounting cost information is taken from their sustainability or CSR reports published a year after their annual financial reports. The first direction of the model shows environmental costs as the independent variable affecting market performance and financial performance. This follows that the resource-based view perspective that espouses investments in CSR has tangible benefits. The reverse direction of the relationships uses environmental accounting information as the dependent variable, following the slack availability of resources view where good market and financial performance facilitate investments in corporate social and environmental performance.

HYPOTHESES

Based on the concurrent bi-directionality of environmental innovations costs and market performance, I therefore hypothesize:

H1a: Environmental innovations costs positively impact market performance measured in high stock price and book value per share.

H1b: Market performance in previous periods positively impact environmental innovations costs.

Kokubu and Nashioka (2002) have earlier established the relationship between environmental innovations cost and financial performance. I pick it up from their findings in 1998 to 2000 and pursue further the relationships of these variables from 2004 to 2009 when presumably more comparable and consistent data are now available. I hypothesize:

H2a: Environmental innovations costs positively impact financial performance measured in firm size, revenues, profit, liquidity, accounting risk, and intangible asset value.

H2b: Financial performance in previous periods positively impact environmental innovations costs.

RESULTS AND DISCUSSIONS

Environmental Innovations & Market Performance

High price for the year, the book value and owners' equity appear to be significantly and positively influenced by environmental innovations as shown by the 0.000 p-values. The high adjusted r-squared which ranges from 0.88 to 0.97 also validate the findings (see Table 1.) These suggest that the market appreciates the environmental innovative practices of companies covered in my study. Increases in stock price cause increases in the book value of common stock and eventually affects the stockholders' equity. I therefore accept H1a that environmental innovations costs positively impact market performance.

On the other hand, the reverse directions of constructs relationships appear to be stronger with a higher R-squared and adjusted R-squared. This supports the fact that companies, to start with, invested in environmental innovations by committing resources. With the felt benefits in market performance, these companies invested further resources. Likewise, I accept H1b that market performance affects investments in environmental innovations costs of TSE manufacturing companies.

Table 1. Impact of environmental costs on market and financial performance				
Independent: environmental innovations				
Dependent variables	Coeff.	P>| t |	R-squared	Adj. R-squared
High price for 1 year	36.69432	0	0.9045	0.8852
Book value	0.0124926	0	0.9761	0.9713
Equity	20.67689	0	0.9753	0.9703
Asset turnover	0.0007961	0.151	0.9515	0.9417
Assets	54.75074	0	0.9823	0.9788
Return on assets	-0.0212175	0.309	0.6381	0.565
Sales	51.71664	0	0.9834	0.98
Pretax income	0.2019439	0.927	0.6453	0.5737
Taxes	0.3992472	0.584	0.7155	0.6581
Income	0.0521775	0.974	0.6278	0.5527
Net profit margin	-0.0285235	0.179	0.7395	0.687
Current assets	19.14795	0	0.986	0.9831
Current liabilities	20.05858	0	0.9762	0.9714
Long-term debt	8.480828	0	0.9823	0.9787
Total liabilities	34.07388	0	0.9821	0.9785
Intangible assets	0.7808023	0.192	0.846	0.815
*Level of significance 0.01; homoscedastic; no autocorrelation.				

Environmental Innovations & Financial Performance

Firm size, revenue, liquidity and risk minimization appear to be the predominant concern why TSE listed manufacturing companies engage in environmental innovations. This holds true for both directions of constructs relationships.

Environmental innovations involve investments in environmental assets, clean technology and production facilities that reduce CO_2 emissions. Environmental innovations costs appear to have a positive relationship with firm size with p-values of 0.000 and high r-squared 0.9823 and adjusted r-squared 0.9788 (see Table 1). This holds true for the reversal direction of relationships with environmental innovations as the dependent variable (see Table 2). However, this is expected because the sample size captures the top actively traded TSE companies which presumably are large corporations.

The p-value for sales (revenue) is 0.000 with an adjusted r-squared value of 0.9800 suggesting goodness of fit. This suggests that revenues of these Japanese manufacturing companies are positively controlled by environmental innovations. The customers of these companies appreciate the environmental performance and it translates to patronage or sales for the companies. There appears to be concurrent bi-directionality as the results in Table 2 somehow mirror the results in Table 1.

Current assets and current liabilities also show 0.000 p-values and adjusted r-squared values of 0.9831 and 0.9714 suggesting goodness of fit. It is not surprising that there is a positive impact on current assets because revenue generation may immediately translate into increases in receivables and eventual cash collections. However, it is interesting to examine the

impact on short-term liabilities. It may be deduced that short-term liabilities increase alongside with environmental innovations, to finance environmental maintenance costs and other short-term expenses. The reversal direction of constructs relationships, on the other hand, appears to be stronger (See Table 2). The adjusted r-squared values are higher for current assets and current liabilities. This suggests how the first direction is reinforced in this cycle of mutually reinforcing variables.

Table 2. Impact of market and financial performance on environmental costs

Dependent: environmental innovations				
Independent variables	Coeff.	P>| t |	R-squared	Adj. R-squared
High price for 1 year	0.0042452	0	0.9721	0.9664
Book value	21.10281	0	0.9756	0.9707
Equity	0.0154194	0	0.9775	0.9729
Asset turnover	22.6137	0.151	0.9675	0.9609
Assets	0.0067683	0	0.9792	0.975
Return on assets	-0.4282085	0.309	0.9672	0.9606
Sales	0.0081179	0	0.9808	0.9769
Pretax income	0.000371	0.927	0.9669	0.9602
Taxes	0.0066011	0.584	0.967	0.9603
Income	0.0001734	0.974	0.9669	0.9602
Net profit margin	-0.5537829	0.179	0.9674	0.9609
Current assets	0.018792	0	0.9788	0.9745
Current liabilities	0.0148892	0	0.9768	0.9721
Long-term debt	0.0273516	0	0.9746	0.9695
Total liabilities	0.0097257	0	0.9779	0.9734
Intangible assets	0.0190476	0.192	0.9674	0.9608
*Level of significance 0.01; homoscedastic; no autocorrelation.				

Exploring the impact of liabilities also reveal positive and significant impact with 0.000 p-values. This suggests that as environmental innovations costs increase, long-term debt and total liabilities increase. It can be deduced that long-term debt is used in financing environmental innovations and other environmental assets. The p-values are 0.000 and the adjusted r-squared are 0.9695 and 0.9734, respectively. Contrary to the business rationale for sustainability, the coefficient is not negative. Hence, risk is not minimized for these Tokyo Stock Exchange-listed companies. However, it should be noted that the Japanese business environment is inherently debt oriented in contrast to western economies that source their financing from their active capital markets.

Contrary to my earlier research (Cortez 2010) on environmental innovations and financial performance of Japanese automotive and electronics companies, profitability turned insignificantly related to environmental innovations. Although from the same manufacturing sector, the companies considered from other manufacturing industries perhaps have varied responses to the recent global economic crisis and appreciating Japanese yen. It is hereby

recommended that industry circumstances be investigated, to qualify conclusions on the relationships of these constructs.

Therefore, I accept H1a and H1b that environmental innovations impact market performance; and vice versa. However, I qualify the acceptance of H2a and H2b to as far as firm size, revenues, liquidity and risk minimization. The impact of environmental innovations on profitability and intangible assets is not supported empirically for these TSE listed companies.

CONCLUSION & RECOMMENDATION

This paper supports the earlier theorization on the resource-based view perspective and the slack availability of resources. Panel data evidence from the top actively traded manufacturing companies for a six-year period (2004 to 2009) support the bi-directional relationship of the constructs – with the first direction being that social and environmental performance impacts market and financial performance, and then vice versa.

The markets care about environmental performance measured in environmental accounting costs. However, social costs are an immaterial, and hence, insignificant factor to financial performance presumably because this is a concern of the government while businesses have overwhelming focus on the environment.

Concurrent bi-directionality is observed between environmental and financial performance as far as firm size, revenue generation, liquidity and risk management. The coefficient for accounting risk / long-term debt did not turn negative as expected but rather show a positive sign. This reflects the uniqueness of the Japanese business environment that relies heavily on debt as the primary source of financing. Profitability and intangible asset values do not appear to be significantly related to social and environmental performance.

With coefficients of the first direction stronger than the reversal direction, I deduce that there is accumulation of benefits from this bi-directional relationship of constructs. It is hereby recommended that longer time periods be covered in the succeeding studies to permit causality tests of variables on these manufacturing companies. Likewise, a longer time lag of cause and effect may be explored to alternatively determine if markets do care about social and environmental performance of these Japanese manufacturing companies.

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ASSESSING STUDENTS' LEARNING IN GOVERNMENT ACCOUNTING

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ABSTRACT

Government Accounting and Reporting (GAR) is one part of the Financial Accounting and Reporting (FAR) section of the Certified Public Accountant (CPA) examination. The Board of Examiners (BOE) oversees the development of the CPA examination. GAR covers between 8% to12% of the FAR section (BOE, 2009). Some topics in GAR include governmental accounting concepts; the format and content of a comprehensive annual financial report (CAFR); financial reporting entities; and specific types of transactions and events (BOE, 2009). Additionally, the Governmental Accounting, Financial Reporting and Budgeting (GAFRB) is a section of the Certified Government Financial Manager (CGFM) examination. The Association of Government Accountants oversees the development of the CGFM examination that covers the field of government financial management in the federal, state and local government environment.

Tools used to assess student learning in this course – a pretest, periodic examinations, utilization of a simulated accounting information system, a group research project and a posttest.

At the start of the Fall 2010 semester, a pretest was administered to all students in the BA401 "Government Accounting" course. The results were that 100% of the students failed (score of less than 70%) this pretest. At the end of the semester, the same test was administered, with the results being that 71% of all students passed (score of 70% and above) the posttest. Overall, there was an increase in students' scores ranging from 18% to 68%. During Spring 2011 semester, this same instrument was used that resulted in 100% of the students failed (score of less than 70%) the pretest and 20% passed (score of 70% and above) the posttest.

The purpose of this assessment is to determine the effectiveness of various teaching strategies and assessment tools used in a government accounting course.

INTRODUCTION

The purpose of this analysis is to assess the effectiveness of the teaching strategies and tools used in a government accounting course. Government Accounting is an advanced level course for students in the accounting major program at the University of Guam School of Business and Public Administration (UOG SBPA). Students entering BA401 should be able and prepared to obtain greater knowledge in the principles of accounting as they apply to governmental and non-profit entities. BA401 Government Accounting is a course designed to

provide a framework for understanding the special accounting and reporting requirements of such entities, with particular emphasis on reporting concepts and budgeting principles.

Private sector entities are in the business of making profits, whereas governmental entities exist to provide services to the general public. Such services are deemed necessary to support the greater good of a community, and to do so in such a way as to maintain operations, while recovering costs without seeking or building profit margins. This stark difference provides the underlying basis for which people, especially those in the accounting field, must understand that, and how, government accounting differs from private sector accounting.

In the private sector, profits are commendable and expected, however in the government arena, profits are neither expected nor commendable (Granof & Khumawala, 2011; Wilson, Kattelus, & Reck, 2010). Any monies constituting a perceived "profit" for the government serves as a seeming signal to citizens that the full range of expected services are not being provided to the community or that taxes being paid are higher than they could be. This fundamental difference is explained to students on the first day of class. Students are informed that they will need to approach learning in BA401 with a mindset different from traditional, profit motive commercial accounting, to understanding how resources are used and managed in the government environment, with a goal of net-zero.

In contrast to commercial accounting courses, BA401 Government Accounting provides students with a working knowledge of all echelons of government accounting within the U.S This assessment will use a static instrument: a sixty (60) question multiple-choice test, administered at the start and end of the course, to determine the variation in levels of student learning.

LITERATURE REVIEW

BA401 Government Accounting is an advanced level course of the accounting major program at UOG SBPA. All entering students are in their fourth year of undergraduate studies. Students at this level, the senior level of their program, are known to be more mature than those in the freshman level (Klein, Freedman, Shavelson, Bolus, 2008). By the time students reach this phase of their schooling, they are usually finishing their student careers and preparing to enter the workforce as full-time employees. Assessing their level of learning becomes increasingly important at this point in time, because they are exiting the academic arena and must rely on their developed skills and knowledge to succeed in the workforce.

According to the Center of Excellence in Teaching (n.d.), when conducting such assessments of student learning, there are several principles that are important to keep in mind: Assessments should always be linked to course objectives. Whatever techniques or approaches are taken, one should attempt to understand to what degree students are learning the material they are expected to master.

Assessments should be regular and on-going. A combination of formative and summative techniques should be used during the course to gain regular feedback on student progress. Assessments should be designed to facilitate learning – for instructors as well as students. Assessments should reflect on students' learning and provide instructors with signals as to what help students might need, as well as give instructors insight into what areas to cover in greater depth. An equally important principle for an instructor conducting an assessment is the instructors' willingness and openness to consider possible adjustments in teaching style.

Instructors should share with the students what has been learned after each assessment. Discussion questions may include "With what content did students struggle most?"; "What were common questions or misunderstandings?"; and "What will be done differently to facilitate student learning?"

Best Practices in Pedagogical Strategies Employed

Morgan (2006) identified best practices in pedagogical strategies that became successful projects involving assessment of student learning such as the (1) maximization of student engagement; (2) added emphasis of active learning; and (3) redesign of course activities.

The BA401 course is designed to incorporate three main components - written examinations, utilization of a simulated accounting information system, and a group research project. Written examinations are, of course, traditionally used as a tool to measure student learning and comprehension. The use of the simulated accounting information system provides students with the practical application of government accounting practices and principles to life-like scenarios in which they need to manage a small government. The group research projects require students to engage with each other which will aide in the development of communication and cooperation skills, as students are required to work together throughout the research phase and until the final presentation.

Chun (2010) stated, "The ultimate goal of teaching is the development in students of transferrable skills and knowledge. Arguably, if they complete a sufficient number of performance tasks, students will not only master the content knowledge and skills for a particular course, but they will also gain the practice they need to be better critical thinkers when they face novel scenarios or problems, either within the same domain or across domains" (p. 24). Shavelson and Huang (2003) stated, "We believe that by linking knowledge and various kinds of abilities in a single framework, we can perhaps begin to speak to one another coherently about the relative merits of assessing different kinds of learning with different kinds of tests" (p. 13). Michaels (1999) conducted an assessment using the pre- and posttests. In his findings, he found that using this type of instrument was easy to collect the before and after data. The pretest and posttest method allows the instructor to assess students' knowledge of different portions of the course content in different sections of the same course.

Accounting Program at the University of Guam

Prior to Fall 2006, the University of Guam School of Business and Public Administration (UOG SBPA) offered accounting as a concentration degree program. This degree required students to take twelve (12) credit hours in accounting as part of the total requirement of one hundred twenty-four (124) credit hours. To earn the accounting concentration degree, students were required only to take courses as high as the 300-level such as Intermediate Accounting I, Intermediate Accounting II, Individual Income Tax and Cost Accounting I. Advanced level courses, such as BA401 Government Accounting, were not required. Table 1 is a summary of the requirements for the Bachelor of Business Administration (BBA) degree with a concentration in accounting.

Table 1
Summary of Requirements for BBA Degree
Accounting Concentration

Curricular Component	Credit Hours
General Education	55
BBA Foundation	51
BBA Concentration	12
Upper-Division Free Electives	6
Total Semester Credit Hours	124

In Fall 2006, the Bachelor of Business Administration in Accounting (BBAA) was offered as a new major under the School of Business & Public Administration. Students seeking the BBAA major were required to obtain a total of thirty (30) credit hours of accounting courses, inclusive of the twelve (12) credit hours from the concentration program. The additional accounting courses included six (6) 400-level courses, one of which was BA401 Government Accounting. The University's established prerequisite for BA401, is BA301 with a grade of "C" or better. Tuttle (2011) study indicated that only 20% of small public universities (enrollment of fewer than 10,000) require governmental accounting in their accounting program, 40% offered this course as an elective and 40% did not offer a government accounting course. UOG's enrollment is less than 4,000, therefore is categorized as a "small" public university. Table 2 is a summary of the requirements for the BBAA degree program.

Table 2
Summary of Requirements for BBAA Degree
Accounting Major

Curricular Component	Credit Hours
General Education	55
BBA Foundation	51
BBAA Major	30
Total Semester Credit Hours	136

Students entering 400-level courses should have already developed a strong grasp of fundamental accounting principles, including a mastery of all aspects of the accounting cycle (e.g., analyzing, journalizing, posting, adjustments to accounts, preparation of financial statements and closing of the accounting period).

Students exiting the accounting program are expected to be prepared with the level of knowledge and understanding necessary to take the CPA or CGFM exam.

Characteristics of Governmental Entities

Characteristics of the governmental accounting environment include service, lack of profit motive, dependence on legislative authorities, taxes as source of revenue, responsibility to citizens, and restrictions and controls (Granof, 2011; Bisk, 2010; Wilson, 2010). These characteristics can be described as follows:

Service

A government provides to its citizens services deemed necessary to support the greater good of a community, such as public safety, education, healthcare, environmental protection and infrastructure.

Lack of profit motive

In contrast to private sector entities, governments do not seek profit in the services they provide. Instead, only seek to cover operating costs or to recover losses.

Dependence on legislative authorities

Governments are dependent on, and guided by, legislative authorities. In most cases, governments are required to seek legislative approval for spending for their general operations; or acquiring loans and obligations with a maturity of longer than one year.

Taxes as source of revenue

Taxes are the primary source of revenue for governments. Governments have the power to tax their citizenry. Wilson et al. (2010) defines taxes, “compulsory charges levied by a government for the purpose of financing services performed for the common benefit” (p. 766).

Responsibility to citizens

Since the primary source of revenue for governments is taxes paid by the citizenry of a particular community, governments are, and must be, held accountable to the citizens and must always demonstrate good stewardship over its financial resources.

Restrictions and controls

In ensuring and assisting governments in exercising fiscal responsibility, there are restrictions and controls in the use of government resources. Many restrictions are provided for through legislation, such as procurement, expenditures and financial borrowing abilities and authorities.

DISCUSSION

BA401 is designed to prepare students for the "Government Accounting and Reporting" (GAR) part of the "Financial and Accounting and Reporting" (FAR) section of the Certified Public Accountant (CPA) examination and the Governmental Accounting, Financial Reporting and Budgeting (GAFRB) section of the CGFM examination (Association of Government Accountant, 2011).

For the student, the pretest administered at the start of the term is meant to expose students to what the government course will cover, and more importantly, what students will be expected to know in the GAR part of the FAR section of the CPA exam and the GAFRB section of the CGFM examination. For the instructor, the pretest also serves as a tool to assess the level and range of knowledge of entering students.

Course Objectives

Students will learn how to utilize a government accounting software. This objective is assessed using a computerized simulation program.

Students will analyze the relationship between Government Accounting Standard Board (GASB) and Financial Accounting Standard Board (FASB). This objective is assessed through a posttest.

Students will analyze financial data of a government and nonprofit organization's financial data. This objective is assessed through a posttest, research paper and group presentation.

Students will analyze the budgeting control, revenues, and expenditures in the government environment. This objective is assessed through a posttest, research paper and group presentation.

Students will understand the issues of reporting and disclosure requirements of government and nonprofit organizations. This objective is assessed through a posttest, research paper and group presentation.

Students will apply various management accounting tools and techniques for measuring and evaluating operating performance and financial conditions which may be affected by external circumstances. This objective is assessed through a posttest and research project.

Students will understand the ethical consideration in the government and not-for-profit environment. This objective is assessed through a posttest, research paper and group presentation.

Assessment Categories

Table 3 provides the breakdown of the weight each assessment category carries in the determination of a student's final grade.

Table 3
Point Values for the Course

Activity	Fall 2010 Grade %	Spring 2011 Grade %
Periodic Exams	55	45
Simulation	20	20
Research Project	20	20
Post Test	5	5
Participation	0	10
Total	100	100

During the Fall 2010 semester, participation was not included in the students' overall grade, however, in Spring 2011, this activity was required. In addition, the research project used in the Fall 2010 semester was not as intense as compared to the Spring 2011 semester.

Assessment Tools

The assessment tools used to measure student learning in this course included the (1) administration of periodic examinations; (2) oversight of a semester-long simulation project using an automated accounting information system; and (3) a group research project. The analysis presented herein is the first of this type, performed using a pre- and posttest as additional instruments to measure the level of student learning. Note, however, that students in the Fall 2010 semester did not participate in the usual research project, whereas students in Spring 2011 did complete this project.

Periodic examinations

The examination format used was a set of multiple-choice questions, which were based on materials covered from prior weeks. One chapter was covered each week: the first exam occurred in week 4, after the students completed the respective simulation chapters; exam 2 occurred in week 8; exam 3 occurred in week 15; and the posttest at week 16. Before each exam occurred, a review was conducted to help students prepare for the exam. According to Dotson, W. H., Sheldon, J. B., & Sherman, J. A. (2010), students perform better when a review occurs before an examination.

Accounting Information System

The simulation project used an automated accounting information system that provided the students with life-like access to, and practical experience with, managing a government-wide financial system. According to Wilson, et al. (2010), "the dual-track approach captures both government-wide and fund accounting information at the same time an event is recognized, thereby allowing for the direct production of both government-wide and fund financial statements". This activity is intended to teach students how to utilize a government accounting software, which is one of the BA401 course objectives, as described earlier. Students were required to submit this project in three parts throughout the semester; before each exam, a section of the simulation project was due. For example, since the first examination occurred in week 4, the first part of this simulation project was due at the end of week 3.

The simulation used in this course helped to assess students' knowledge, skills, and critical thinking in an environment similar to the actual accounting information system used by many governments. The recording of these transactions differs from profit-seeking organizations. Many students mutually agreed that they learned from the simulation project. It helped them to more easily and clearly understand the different components of government accounting. This supports previous finds of others that simulation as a teaching strategy has been found successful (Rauen, C. 2004; Rauen C. 2001; Eaves, RH, Flagg AJ. 2001; Issenberg SB, McGahie WC, Hart IR, et al., 1999).

Research Project

The group research project required that students work with each other over the course of the semester to prepare a report, for future presentation, detailing (1) the purpose of existence for the particular government or not-for-profit organization; (2) an analysis of the organization's revenue sources and expenses; and (3) the identification of significant financial issues and discussion of recommended solutions to the identified issues.

During the Fall 2010 semester, the research project was modified in such a way that required students to compile and analyze prior research work completed by previous semesters rather than to carry out a research project themselves. This change was mainly due to the fact that students needed more time to complete the simulation project. Therefore, in order to assist student learning in this course, the instructor modified the course activities in order to motivate and help students to better learn the concepts (Smith, nd.; Davis, 1999).

In the Spring 2011 semester, students were required to research a government or not-for-profit organization that identified their revenue and expenditures sources, financial issues (where applicable) and make recommendations to address the organization's financial issues based on best practices. The research project is intended to provide students with real-world transactions and requires students to engage with each other which will aide in the development of communication and cooperation skills.

Pretest and Posttest

The pretest was comprised of sixty (60) multiple-choice questions, taken from the GAR part of the FAR section of the CPA review (Bisk, 2010). This pretest provided the students with a preliminary review as to the subject matter of BA401. The results of the pretest were also useful in allowing the instructor to gauge each student's level of understanding of general accounting practices upon entering the course. In addition to one essay question, this same test was again administered at the end of the semester. The comparison of results between the pretest and posttest provide the foundation for the assessment presented in this report.

Participation

During Fall 2010, participation was not weighted in the calculation of students' semester grades. In Spring 2011, however, this activity was weighted at ten percent (10%) of students' semester grade. Participation activities included weekly journals and weekly discussion questions. Although students were always required to read the assigned chapter before meeting in class, the instructor was unable to determine if students were meeting this requirement. Therefore, in Spring 2011, students were additionally required to respond to one to two discussion questions before the class meeting. This provided a more clear indication to the instructor that students did read the assigned chapter for the week.

INSTRUMENT

The instrument used for this assessment was a written examination consisting of sixty (60) multiple-choice questions, which were randomly taken from the GAR part of the FAR section of the CPA review (Bisk, 2010). The value and validity of this instrument is upheld based

on the premise that the question used were actual questions appearing in CPA exams administered in previous years. The Committee on Human Research Subjects has approved this study (Murphy, 2010).

The instrument was the same for the pretest and posttest, with the exception of the added essay question on the posttest. The pretest and posttest were administered using a hosted online testing software. This course does not teach to the test, although, students are informed about the posttest, which is included in their semester grade calculation.

METHODOLOGY

The test was administered to all entering students at the start of the Fall 2010 and Spring 2011 semesters for BA401. At the end of the each semester, this test was re-administered. In addition to the sixty (60) multiple-choice questions, students were also given one essay question that asked the students to list two to five of the most significant things they learned during the course (Eder, 2005).

The participants used in this assessment were students who remained enrolled in BA401 Government Accounting during the entirety of both the Fall 2010 and Spring 2011 semesters.

DATA ANALYSIS

To analyze the data gathered in this assessment, Microsoft Excel spreadsheet software was used to determine the change in students' scores from the pretest to posttest. Across the board, there were measureable and notable increases in the students' scores ranging from an 18% to 68% improvement. There were no decreases in scores.

The instrument used in this assessment has a direct relationship to the course objectives, in that students are tested for evidence of knowledge of the concepts presented during the semester. Furthermore, according to Wilson et al. (2010), the textbook is well suited for seniors in an undergraduate program who plan on participating in the CPA exam or the CGFM exam.

Table 4
Pretest and Posttest Results

	Fall 2010			Spring 2011		
Student	Pretest %	Posttest %	Change %	Pretest %	Posttest %	Change %
Student #1	21	39	18	55	77	22
Student #2	16	54	38	32	65	33
Student #3	28	73	45	27	47	20
Student #4	28	73	45	23	65	42
Student #5	23	78	55	17	65	48
Student #6	28	86	58			
Student #7	13	81	68			

The minimum change in score during the Fall 2010 semester was 18% and the maximum change in score was 68%. In the Spring 2011 semester, the minimum change in score was 22% and the maximum change in score was 48%. Note, "Student #1" took the course during Fall 2010 and repeated this course in Spring 2011.

Table 5
Pretest and Posttest Results

	Fall 2010		Spring 2011	
Description	Pretest	Posttest	Pretest	Posttest
Mean	22.43	69.14	30.8	63.8
Std. Dev.	6.43	16.69	14.6	10.73
Maximum	28	86	55	77
Minimum	13	39	17	47
Count	7	7	5	5
t-statistic		7.68		6.05
p-value		0.00026		0.00.78
t critical value (5%) two tailed distribution		2.45		2.78
Fall 2010 and Spring 2011 Posttest Results				
t-statistic				0.67
p-value				0.51553
t critical value (5%) two tailed distribution				0.52

During Fall 2010, the average score for the pretest was 22.43% and the average score for the posttest was 69.14%. During Spring 2011, the average score for the pretest was 30.80% and the average score for the posttest was 63.80%. The calculated t-statistics show that there is evidence of improvement in the average scores between the pretest and posttest. This result is statistically significant at a 5% level. The posttest results between the Fall 2010 and Spring 2011 semesters show that there is no significant difference at a 5% level.

The increase in students' scores may be attributed to the required simulation project. This project, also known as the "City of Bingham" or "City of Smithville" simulation contains continuous computerized problems. According to Wilson et al. (2010), the following is a description of the simulation used in this course:

"A greater conceptual understanding of governmental financial statements also makes it easier for students to understand the reclassification approach when it is encountered. The dual-track pedagogy can help students see the short- and long-term effects of the decisions made by government managers and oversight bodies from the perspective of all stakeholders" (The Dual-track Accounting Approach para. 5).

Additionally, this project requires the student to create, monitor and prepare financial statements of more than one accounting cycle of a government, similar to assessment tasks (Chun, 2010). A partial attribution of the score increases to the simulation project is supported by

this philosophy. In any arena in which students are exposed to practical applications of the knowledge gained in a classroom, or out of a textbook, one will find evidence of a better understanding of learned concepts.

CONCLUSION

The strategies used in this course are administering periodic examinations, maintaining a *government* accounting information system, researching our local government entities and administering the pre- and posttests. In Fall 2010, because students had a difficult time with the simulation project, the research project was modified based on the type of projects used by prior semesters. Like in other fields, government accounting is an upper division course, therefore, students were expected and required to use their skills and knowledge gained from the lower division courses of the accounting major program. The simulation required that students analyze and record, via journal entry, each transaction. After transactions were recorded, financial statements were then prepared. The simulation project required students to recall the accounting cycle previously learned from their lower division courses. Many students from both semesters shared with the instructor that the simulation project was a useful tool used in this course as it made them aware of how a government accounting information system works.

Periodic examination is the norm for assessing student learning. However, not all students perform well under exam conditions. The simulation and research project contributes in the assessment process as it provides students with real-life scenarios and provides additional learning activities in the classroom (Murphy, 2005; Thatcher, D. C., 1990). In order to motivate students to learn, the instructor used other activities to measure student learning in the classroom.

This assessment was made with some limitations, more specifically, that only a single professor teaches government accounting at UOG and this one course is required only to students in the accounting major program. Other limitations include insufficient literature available that focused on assessing upper division courses of an accounting major program.

Using the data gathered during the Fall 2010 semester, this assessment revealed that one hundred percent (100%) of the students failed (score of less than 70%) the pretest, while seventy-one percent (71%) of the students passed (score of 70% and above) the posttest. Overall, there was a positive change in students' scores, with the lowest variation being eighteen percent (18%) and the highest being sixty-eight percent (68%), a range which is both measurable and notable. Additionally, this also indicates that none of the students' scores decreased at the time of the posttest, when compared to the pretest.

Using the data gathered during the Spring 2011 semester, this assessment revealed that one hundred percent (100%) of the students failed the pretest, while twenty percent (20%) passed the posttest. Overall there was a positive change in students' scores, with the lowest variation being twenty-two percent (22%) and the highest being forty-eight percent (48%). The fact that in Fall 2010, students did not complete the usual research project used in this course, whereas in

Spring 2011, students did complete the research project, may have attributed to the decrease in the number of students that passed the posttest.

During Spring 2011, students were required to complete more activities than in the Fall 2010 semester. Due to the low percentage of students passing the posttest in the Spring 2011 semester, the instructor will continue collecting data for comparison to determine if a pattern exists to justify a change in activities for this course. One consideration could be, for example, "will students pass the posttest if fewer requirements are set for this course?" In Fall 2010, a higher number of students passed the posttest when fewer activities were required during the semester. In Spring 2011, fewer students passed the posttest when a greater number of activities were required for this semester.

This analysis will continue in the future semesters of government accounting and the results of such analyses will be tracked, and can be provided, over time. It is expected that such analysis will continue to be carried out using the same, or similar, instruments. However, should future results continue to illustrate that student performance decreases depending on the number of required assignments, the instructor will have to take this into consideration when designing future syllabi. More specifically, the instructor may be faced with deciding whether to include or how much to weigh one assignment over another, like the research project, for example, if a simulation project requires more time for the students, but also proves to be most effective tool in capturing interest and increasing student learning. Most notable for the instructor and other instructors, programs or universities, is the value of using the pre- and posttest methods to gauge the level, and range, of knowledge and to measure student learning. While the overall number of students who passed the test decreased, all students' scores increased from the pre- to the posttest. This situation is beneficial in that it illustrates that students did in fact learn; and also affords the instructor an opportunity to review indications of the effectiveness of teaching strategies, methods, and structure, which can be revisited, if necessary, when designing syllabi for future classes.

FUTURE RESEARCH

Additional research for consideration is to cover the review of various teaching methods of government accounting. Research may also include discussion of how to assess student learning in intermediate level courses in the UOG SBPA Accounting Program. As mentioned earlier, students entering advanced accounting courses are expected to come prepared with a mastery of basic accounting principles. However, when students do not possess this level of knowledge, there is a forced diversion from the course syllabi, which is initially designed to focus on advanced areas of accounting.

While this diversion results in increased classroom time spent on review of intermediate accounting which may prove beneficial in the short-term, doing so takes away from the

opportunity to thoroughly address advanced level accounting concepts, which are important in the long-term.

The method of the pretest and posttest analysis will likely continue into future semesters of BA401, with possible variations. For example, several pretests may be administered throughout the semester prior to discussion on various sections of the course syllabus. This method can provide a more clear indication of student learning as the course progresses.

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THE ROLE OF R&D ON THE VALUATION OF IPO FIRMS

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ABSTRACT

The principal objective of this study was to confirm the influence of IPO Firm's R&D Expenses on firm value by making use of the firm's financial materials prior to and following aimed-at listings listed newly on the stock market after 1990. In order to accomplish this research objective, this study comparatively analyzed the financial outcomes of those firm prior to and after the IPO, and between high-tech and low-tech industries. This study subsequently employed the 5-year financial data of those firms (including the year of IPO) to analyze the potential effects of R&D expenses of IPO firms on their firm values. First, with regard to the results of comparison of the financial outcomes prior to and after the first IPO, total assets, total liabilities, net income, and R&D Expenses after the listing were found to be significantly lower than prior to the listing, and the financial indices (business growth, profitability and activity) of IPO firms were lower after the IPO than before. Secondly, it was determined that the stock price, book values, earnings, and R&D expenses of high-tech industries were significantly higher than those of low-tech industries, and that both the BIS ratio and DEBT ratio - two indices of firm stability – in the high-tech industry were significantly higher or lower than those of the low-tech industry. Moreover, it was also shown that the high-tech industry had higher financial indices of business growth and profitability than the low-tech industry. Thirdly, it was determined that the IPO firm's R&D expenses exert positive effects on their firm values, and that the price earnings ratio of R&D expenses in the high-tech industry was higher than that in the low-tech industry; this demonstrates that R&D expenses spent on high-tech industries generate high information effects on accounting for firm values, relative to those spent on low-tech industries. Fourthly, it was determined that R&D expenses and capitalizing R&D expenses positively affected firm values. In particular, the expenditure of R&D expenses resulted in higher price earnings ratios in high-tech industries than in low-tech industries.

INTRODUCTION

The current global economic trend is for firms to continually increase their Research and Development (R&D) Expenses, owing to rapid changes in the industrial environment and the rapid advance of information technology. These R&D investments are a critically important

activity in terms of firms' future competitiveness. Therefore, it is critically important to ensure technological competitiveness, which provides firms with ascendancy over other firms in the reality of unlimited competition. Moreover, the development of excellent new technology, the improvement of existing products, and the innovation of a production line that satisfies customers' desires constitute the most important factors in successful firm survival and advancement. R&D expenses, in particular, represent a very important factor in firms led by R&D, as it significantly affects the future value of the firms. Firms' future growth and profitability are influenced by investments in R&D Expenses, and the economic benefits that derive from R&D are sizeable.

The total outlay of Korean firms on R&D Expenses exceeded one trillion won in 1985, 2 trillion won in 1988, 3 trillion won in 1990, 4 trillion won in 1991, and reached a figure of 10.8781 trillion won in 1996. However, in 1997, the Korean economy sank into an extreme recession due to the East Asian Financial Crisis, and firms' R&D investments declined substantially. Since 1999, the importance of R&D Expenses has again been recognized, and R&D Expenses returned to pre-East Asian Financial Crisis levels in 2000. In 2006, R&D expenditures increased to 27.3457 trillion won, more than double pre-crisis levels. Similarly, a great deal of research has been conducted to evaluate the effects of expenses, particularly those with intangible values such as R&D Expenses, on firm value, based on the understanding that the relative importance of intangible assets to recent firm value evaluations is gradually increasing, and is followed by a continuous increase in R&D expenses. According to the findings of current research, R&D expenses and advertising expenses are not simple expenses, but rather exert complex positive effects on firm values, fostering future economic benefits. This means that R&D expenses and advertising expenses possess some attributes of intangible assets (Hirschey, 1982; Chauvin & Hirschey, 1993; Sougiannis, 1994; Lev & Sougiannis, 1996).

These studies into the value relevance of R&D expenses have come to some interesting findings in their assessments of pre-existing listed firms; however, research into IPO firms has been relatively sparse thus far. In particular, as IPO firms have yet to fully disclose their information to the public (unlike pre-existing listed firms), there is no option but to depend principally on accounting information for an estimation of the firm’s value. In the investor’s stead, all information regarding the firm’s financial position, business activity, future prospects, etc. is required. Therefore, the accounting information concerning R&D Expenses, which increases continually and is closely associated with firms’ future growth and profitability, may be extremely valuable information for investors.

Accordingly, this research analyzed the value relevance between an IPO firm’s R&D expenses and the firm value, using data obtained from 631 sample IPO firms newly listed from 1990 to 2005. First, this study provides a comparative analysis of financial outcomes prior to and after IPO, as well as another comparative analysis of the financial outcomes between High-Tech and Low-Tech industries; second, the study attempts to characterize the effects of the IPO firm’s R&D expenses on firm value.

This paper is organized as follows: Section 2 presents our literature review and outlines the background of this study. Section 3 introduces the research methods and sample selection procedures. Section 4 provides the empirical results, and Section 5 presents our concluding remarks.

LITERATURE REVIEW

The literature relevant to R&D expenses falls into four distinct types: 1) research analyzing the effects of the outlay of R&D expenses on firm value or growth, 2) research to confirm the efficiency of R&D-associated tax support policies, 3) research concerning R&D expense accounting, and 4) research regarding the defined factors of R&D investment.

The importance of R&D activities in business administration is constantly increasing, and outlays on R&D expenses are increasing by degrees (Chung, Jeon & Kim, 2003). Additionally, a recently conducted study analyzed the relevance between R&D investment made known to the investors and firm performance (Paek, Song & Jeon, 2004; Lev, 2001; Lev & Zarowin, 1999). According to the current literature concerning R&D investment, outlays for R&D expenses affect firm profitability, and contribute to sales and profit increases. Moreover, it has been noted that outlays on R&D expenses function, from the investors' perspective, as a significantly positive signal of the stock price in the market. That is, investors perceive outlays for R&D Expenses not as a simple expense, but rather as an investment made in anticipation of future benefits (Lev, 2001).

It is generally held that the outlay for R&D Expenses positively affects future accounting returns and market value (Sougiannis, 1994; Lev, 2001; Core, Guay & Buskirk, 2003). Additionally, some studies have proposed that when repaying the outlay for R&D expenses after capitalization, firm value becomes a matter of increasing relevance (Lev & Sougiannis, 1996; Ballester, Garcia-Ayuso & Livnat, 2000; Chambers, Jenning & Thompson, 2002; Chan, Louis, Lakonishok & Sougiannis, 2001). These researchers insist that the accounting transaction of R&D expenses covering the cost is not currently consistent with the principle of properly matching costs with revenues (Wallman, 1996; Lev & Zarowin, 1999).

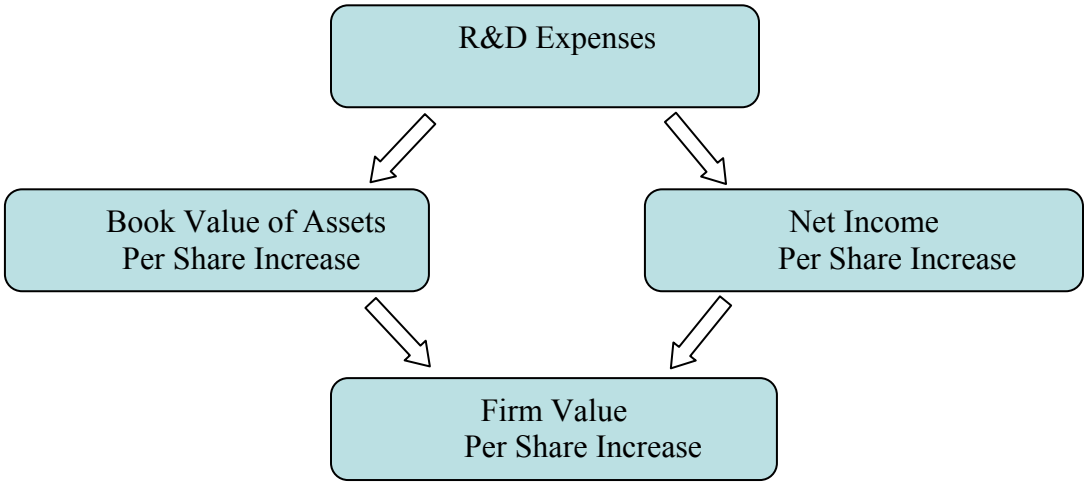
Additionally, two different types of literature reviews exist that can effectively analyze the effects of outlays for R&D expenses on improvements in firm value for Initial Public Offering (IPO) firms. The first of these types are studies of the role of R&D Expenses in computing initial public price offerings for IPO firms (Choi, 2003; Guo, Lev & Zhou, 2004), and the second type is research assessing the relevance of R&D expenses and firm value (Park & Yang, 2006).

The relevance of R&D expenses and firm value originates from the notion that paid R&D expenses can improve firm value and business outcomes in the future by facilitating the development of new products and services, and by improving the quality of currently existing products and services. According to the Feltham and Ohlson model depicted in <Figure 1>, book

value and earnings explain firm value; therefore, R&D expenses can contribute to both earning and book value, and thus firm value(Cheong & Park, 2004).

Combining the results of all the literature reviews, outlays for R&D expenses can be concluded to positively affect firm value; this, in turn, indicates that outlays for R&D expenses should generate future economic benefits (Lev, 2001; Paek, Song & Jeon, 2004).

Figure 1 Feltham and Ohlson model of R&D expenses and the relationship with firm value



According to Structural Analysis on R&D Expenses of Industry from the Korea Institute of Science & Technology Evaluation and Planning (KISTEP), in 2006, R&D expenses of the Korean High-Tech Industry totaled 17.2671 trillion won, but R&D expenses for Korean Low-Tech Industry totaled only 1.7587 trillion won.[1] Similarly, the importance of the Korean High-Tech Industry's R&D expenses among the entire industry is quite high. Therefore, it may prove interesting to assess the differences in the information usefulness of R&D expenses between the High-Tech Industry, which has high R&D expenses, and the Low-Tech Industry, which has relatively low R&D expenses. In order to apply an empirical analysis technique toward this objective, the following hypothesis was established:

H1 *In IPO firms, the Price Earnings Ratio (PER) to the High-Tech Industry's R&D expenses is larger than the PER to the Low-Tech Industry's R&D expenses.*

The term "High Growth Rate of Sales" refers to an increase in the sales or price deriving from an increase in customer demand for the products manufactured and sold by the firm. In this case, the firm will tend to strengthen R&D Investment, thus accelerating the increase in sales. Therefore, we anticipate that this effect on Firm Value, exerted by the R&D expenses of the firm

having a high growth rate of sales, should differ distinctly from the effects on firm value of the R&D expenses of a firm with a low growth rate of sales (Aboody & Lev, 1998; Healy, Myers & Howe, 2002). Hence, an additional hypothesis was established.

H2: In the case of IPO firms, the PER to R&D expenses of a firm with a high growth rate of sales is larger than the PER to R&D expenses of a firm with a low growth rate of sales.

Having a high market value ratio, in contrast to the firm's book value, means that the firm value receives a higher valuation than the book value, as the consequence of the high expectations regarding the firm's future cash flow. This high firm value requires firms to exert significant effort toward product improvement and product differentiation via R&D investment, which ultimately induces an expansion in R&D investment. Therefore, we can anticipate that the R&D expenses of a firm with a high market value ratio and the R&D expenses of a firm with a low market value ratio, in contrast to the firm's book value, should affect firm value differently (Lev, 2001; Chan, Louis, Lakonishok & Sougiannis, 2001).

H3: In the case of IPO firms, the PER to R&D expenses of a firm with a high market value ratio in contrast to the book value is larger than the PER to R&D expenses of a firm with a low market value ratio, in contrast to the book value.

RESEARCH METHOD & SAMPLE SELECTION

Research Method

This research verifies the value relevance of firm value and R&D expenses, using Ohlson's Model (1995). Ohlson's (1995) accounting-based equity valuation model employs parameters such as links between a firms' book values, earnings, net dividends, other information, and equity market values by integrating the dividend discount model with clean surplus accounting, modified first-order autoregressive linear information dynamics, the assumption of no information asymmetry, and market efficiency. Ohlson's model begins with the combination of the dividend discount model with clean surplus accounting. His model is characterized by the linear function of book values and earnings, as is shown in Formula (1) (Penman & Sougiannis, 1998; Dechow, Hutton & Slaon, 1999). However, it is actually quite difficult to measure other information (O), unless surplus accounting is employed. Moreover, if the mean value is not 0 and the model is assumed without regard to the facts, econometric problems can arise, such as autocorrelation between residuals. Such issues can be addressed by adding sections and residuals to Formula (1) (Myers, 1999).

$$V_t=\{(1+r)(1-\omega)/(1+r-\omega)\} \cdot BV_{t-1} + \{(1+r)\omega/(1+r-\omega)\} \cdot E_t - \{r\omega/1+r-\omega)\}D_t + q \cdot O_t \qquad (1)$$

V_t = corporate value at *t*
BV_{t-1} = equity of book value at *t-1*
E_t = accounting earnings for period *t*
D_t = net dividend at *t*
$q = \{(1+r)/\{(1+r-\omega)(1+r-\theta)\}$, ($\theta$ is the 1st order auto-correlation coefficient)
O_t = other information
r = three-period risk-free return
ω = persistence parameter of abnormal earnings

In reviews of the relevant literature, it has been noted that in the case of the negative earnings as compared to the positive earnings, the relationship between earnings and stock prices evidence different behavior in terms of quality (Hayn, 1995; Collins, Maydew & Weiss, 1997). In this research, the regression coefficient of the positive earnings and that of the negative earnings differ when NEGE is included in the negative earnings. Additionally, if a dependent variable is determined by the economic environment of a specific year during the sample period apart from independent variables, a cross-sectional correlation in the observed value may be observed; the residual's autocorrelation arises because the dependent variable's time-series autocorrelation exists as a matter of the characteristics of the financial variables. There also exists the possibility that the estimated regression coefficient and its standard error are not unbiased, owing to the correlation of the cross-section and time series. To control for this, the Yearly Dummy Variable (YR) is added (Park, Jeon & Lee, 2004). Furthermore, in analyses in which financial materials are employed, heteroscedasticity issues can arise, depending on the business scale. To minimize this, such analyses frequently apply compartmentalization to the financial data (Paek, Song & Jeon, 2004). Therefore, in this study, the variables utilized for empirical analysis were the amounts per share. Under the modified Formula (1) conditions discussed previously, and replacing Corporate Value (V) with Stock Price (P), we can re-express Formula (1) as Formula (2):

$$P_t = b_0 + b_1 BV_{t-1} + b_2 E_t + b_3 NEGE_t + b_4 \sum_k YR_{kt} + e_t \quad (2)$$

P_t = Market value at the three months after fiscal year *t*
BV_{t-1} = Equity of book value per share at *t-1*
E_t = Net income per share at *t*
$NEGE_t = E_t$ when E_t is negative, and 0 otherwise
YR_{kt} = 1 when the data belong to year k, and 0 otherwise (k=1990, 1991.....2005).

In this paper, assessing the measurement of variables included in Formula (2), P utilizes the common stock's weekly price at a timepoint three months after the end of fiscal year *t*. Generally, if a firm's settling day is at the end of December, P_t is the stock price in March of the

following year, since the announcement of accounts is largely accomplished by the end of March of the following year. IPO firms undergo evaluations principally on the basis of information in financial statements; therefore, it is important to take into careful consideration not only book values and earnings, but also the values of intangible assets associated with R&D investment.[3] Lev & Sougiannis (1996) confirmed the positive relationship between PER and the firm's income as a consequence of reassuming the current income after capitalizing R&D Expenses; this was previously treated as the current expenses. Based on this, that group elucidated the necessity of capital accounting for R&D Expenses:

$$P_t = b_0 + b_1BV_{t-1} + b_2AE_t + b_3R\&D_t + b_4NEGE_t + b_5\sum_k YR_{kt} + e_t \quad (3)$$
$$P_t = b_0 + b_1BV_{t-1} + b_2AE_t + b_3R\&D_t + b_{41}R\&D_t*DUM1 + b_5NEGE_t + b_6\sum_k YR_{kt} + e_t \quad (4)$$
$$P_t = b_0 + b_1BV_{t-1} + b_2AE_t + b_3R\&D_t + b_{42}R\&D_t*DUM1 + b_5NEGE_t + b_6\sum_k YR_{kt} + e_t \quad (5)$$
$$P_t = b_0 + b_1BV_{t-1} + b_2AE_t + b_3R\&D_t + b_{43}R\&D_t*DUM1 + b_5NEGE_t + b_6\sum_k YR_{kt} + e_t \quad (6)$$

AE_t = Net income per share at *t* + R&D Expenses per share at *t*
$R\&D_t$ = R&D Expenses per share at *t*
DUM1 = According to Industrial Classification, High-Tech Industry is 1, and Low-Tech Industry is 0.
DUM2 = 1 if firm group's growth rate of sales is higher than median, and 0 otherwise.
DUM3 = 1 if firm group's market value ratio contrast to book value is higher than median, and 0 otherwise

DUM1 is a dummy variable defining High-Tech Industry and Medium High-Tech Industry as High-Tech Industry, and defining Medium Low-Tech Industry and Low-Tech Industry as Low-Tech Industry, in accordance with the OECD Standard Industrial Classifications. In Formula (4), the effect on firm value exerted by High-Tech Industry's outlay for R&D Expenses is expressed as b_3+b_{41}. In this case, if b_3+b_{41} is larger than b_3, this study's Hypothesis 1, "In the case of IPO firms, the Price Earnings Ratio (PER) to High-Tech Industry's outlay on R&D Expenses is bigger than the PER to Low-Tech Industry's outlay on R&D Expenses," is supported. In Formula (5), the effect on Firm Value associated with the R&D Expenses of a firm with a high sales growth rate is b_3+b_{42}. That is, if b_3+b_{42} is larger than b_3, this study's Hypothesis 2--"In the case of IPO firms, PER to the outlay on R&D expenses of the firm having a high growth rate of sales is bigger than the PER to the outlay on R&D expenses of the firm having low growth rate of sales", is supported. In Formula (6), the effect on firm value associated with the R&D Expenses of a firm with a high market value ratio in contrast to book value, is b_3+b_{43}. If b_3+b_{43} is larger than b_3, Hypothesis 3, "In the case of IPO firms, PER to R&D expenses outlay of the firm having high market value ratio contrast to book value is bigger than the PER to R&D Expenses outlay of the firm having low market value ratio contrast to book value," is supported.

$$P_t = b_0 + b_1 AABV_t + b_2 RD_t + b_3 AE_t + b_4 R\&D_t + b_5 NEGE_t + b_6 \sum_k YR_{kt} + e_t \quad (7)$$

$$P_t = b_0 + b_1 AABV_t + b_2 RD_t + b_3 RD_t * DUM1 + b_4 AE_t + b_5 R\&D_t + b_6 R\&D_t * DUM1 + b_7 NEGE_t + b_8 \sum_k YR_{kt} + e_t \quad (8)$$

$AABV_t$ = Equity of book value per share at *t* - Net income per share at *t* - Development Expenses per share at *t*
RD_t = Development Expenses per share at *t*

According to the current financial accounting standards provided, the account of research expenses, in principle, covers the expenses incurred in the research phases, and also capitalizes the expenses incurred in the development phases in order to fulfill the conditions necessary for capitalization. In cases in which the necessary conditions for capitalization are not met, the ordinary development expense account covers the expenses. Therefore, the model is established under the assumption that the effects on firm value exerted by the R&D expenses of income statements paid this term, and the capitalized development expenses of the balance sheet differ. Formula (7) decouples the modified profit from the paid R&D expenses, and also decouples the modified net assets from the capitalized development expenses. Furthermore, Formula (8) includes each of the terms correlated with the dummy variable, which distinguish the High-Tech Industry and Low-Tech Industry, individually, in terms of R&D expenses and Development expenses.

Sample Firm Selection

The financial statement data for the empirical tests was derived from the Korea Investors Service-Value (KIS-Value). The sample data are predicated on the following conditions:

(1) Sample firms were obtained from newly listed firms on the Korea Stock Exchange (KSE) from 1990 to 2005.
(2) Sample firms included no firms without necessary financial data.
(3) Sample firms have December 31 fiscal year-ends.
(4) Sample firms include no firms in the financial sector.

The sample utilized herein is composed of new listings on the stock market from 1990 to 2005. As shown in <Table 1>, 283 firms, in total, were newly listed on the stock market during the sample period; 155 of these comprised our sample (54.8%). In order to ensure the data prior to the listing, firms listed within 2 years after establishment, re-listed firms[4], and firms without data regarding R&D expenses, all of which are necessary for this research's empirical analysis, were excluded from our sample population. Additionally, the selected sample is data of each listed year, for 5 years analyzing of financial materials since the IPO.[5]

Table 1 Sample Selection			
	IPO firms that ended their fiscal year in December excluding financial firms	Excluding re-listed firms	The final sample of including firms with necessary financial materials
1990	30 / 477	30	17 / 73
1991	15 / 492	15	9 / 37
1992	2 / 494	2	2 / 6
1993	8 / 502	8	6 / 21
1994	25 / 527	25	12 / 54
1995	24 / 551	24	17 / 66
1996	39 / 590	37	24 / 101
1997	22 / 612	22	20 / 67
1998	3 / 612	3	2 / 10
1999	15 / 594	13	10 / 46
2000	5 / 586	4	2 / 10
2001	3 / 583	3	2 / 10
2002	22 / 576	10	10 / 45
2003	15 / 577	11	8 / 40
2004	25 / 585	11	8 / 27
2005	30 / 599	11	6 / 18
Total	283 / 8957	229	155 / 631

EMPIRICAL ANALYSIS

Basic Statistical Analysis

Figure 2 shows the annual trend of the IPO firm's R&D expenses in contrast to sales. Based on the listed year, the R&D expenses of the High-Tech Industry evidence an increasing tendency from the previous year of the listing to the third listed year. On the other hand, no change was noted in the Low-Tech Industry prior to and after the listing. Thus, we can clearly see that the High-Tech Industry's outlay for R&D Expenses is higher than the Low-Tech Industry's outlay. Moreover, the capital market evaluation of the same outlay will respond differently.

Comparative descriptives and univariate *t*-tests (*z*-tests) for the major variables prior to and after the listing classifications are provided in Table 2. First, after the IPO, the average and median values of Total Assets (AS), Total Liabilities (LEV), Net Income (E), and R&D

Expenses (R&D) were significantly lower than the values before, with the exception of the book value (BV). However, Development expenses (RD) did not differ. It was previously demonstrated that the firm's financial stability increased after the listing, according to the Bank for International Settlements capital ratio (BIS) (reflective of firm stability) after the listing, and also that the Debt Ratio (DEBT) was reduced after the listing. However, the Growth Rate of Sales (GROWTH), which represents the firm's growth possibility, increases both prior to and after the listing, yet its scale was substantially reduced after the listing. Additionally, the Ratio of Net Income to Net Sales (RETURNS), which reflects profitability, did not differ significantly, but was reduced after the listing, and the Total Asset Turnover Ratio (TURNOVER), which reflects activity, was also significantly reduced after the listing as compared to before the listing.

Figure 2 Annual trend of IPO firms

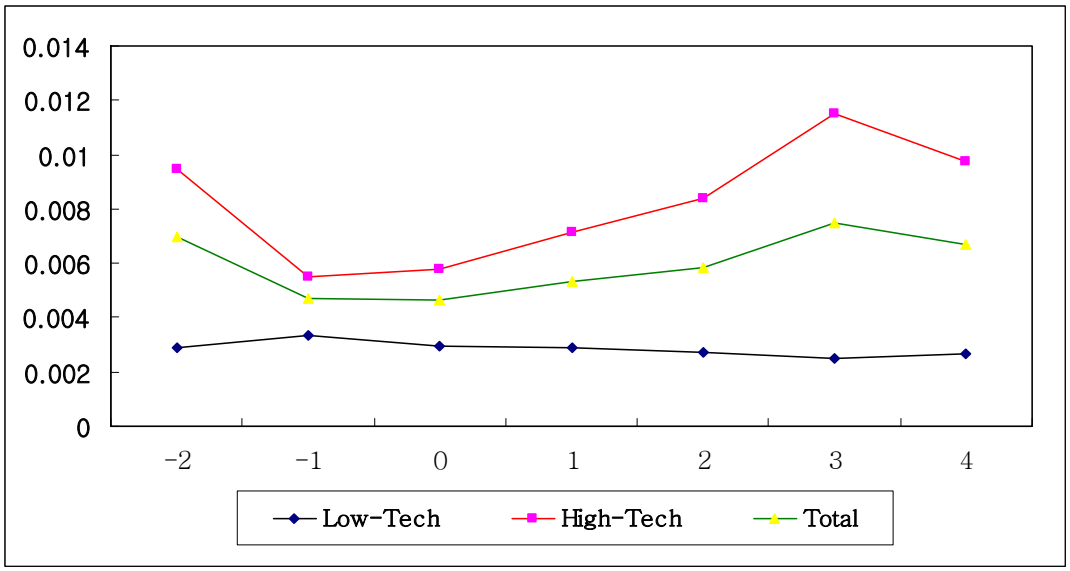


Table 2 Statistic by Before/After IPO firms Classification

	Before IPO (n=120)		After IPO (n=127)		t-statistics	z-statistics
	Mean	Median	Mean	Median		
BV_{t-1}	20008	12077	19278	16336	0.30	-1.38
AS_{t-1}	45668	36642	35324	30442	2.20**	2.01**
LEV_{t-1}	36967	30386	26668	22223	2.53**	2.48**
E_t	3192	1752	2078	1525	2.60***	2.65***
$R\&D_t$	296	65	165	76	2.60***	1.55
RD_t	328	0	300	0	0.27	0.68
BIS(%)	41.11	45.60	46.44	45.59	-2.34**	-2.30**

Table 2 Statistic by Before/After IPO firms Classification						
	Before IPO (n=120)		After IPO (n=127)		t-statistics	z-statistics
DEBT(%)	200.33	119.34	159.18	119.34	2.24**	2.30**
GROWTH(%)	19.70	13.48	13.97	13.47	1.97**	1.68*
RETURNS(%)	6.46	4.71	6.29	4.70	0.20	0.36
TURNOVER(%)	1.37	1.00	1.13	1.00	2.54**	2.72***

Notes*:* Variable definitions
BV_{t-1} = equity of book value per share at *t-1*, AS_{t-1}= book value of assets per share at *t-1*, LEV_{t-1}= book value of liabilities per share at *t-1*, E_t= net income per share at *t*, $R\&D_t$= R&D expenses per share at *t*, RD_t= development expenses per share at *t*, BIS= bank for international settlements capital ratio, DEBT= ratio of total liabilities to total equity, GROWTH= growth rate of sales, RETURNS= ratio of net income to net sales, TURNOVER= total asset turnover ratio

Table 3 Statistics by High-Tech/Low-Tech industry Classification						
	Low-Tech (n=238)		High-Tech (n=393)		t-statistics	z-statistics
	Mean	Median	Mean	Median		
P_t	12561	8060	15604	6800	-1.72*	1.18
BV_{t-1}	16901	12327	18904	17351	-1.83*	-3.71***
AS_{t-1}	39372	31012	36437	31541	1.20	-1.50
LEV_{t-1}	29093	22677	23735	17770	2.45**	2.97***
E_t	1372	855	1336	1084	0.10	-1.51
$R\&D_t$	96	58	215	69	-4.70***	-3.16***
RD_t	143	0	419	1.43	-3.82***	-5.93***
BIS(%)	42.54	39.65	50.05	49.97	-4.32***	-4.70***
DEBT(%)	228.21	149.53	130.06	96.72	3.71***	4.58***
GROWTH(%)	12.92	11.34	17.09	12.09	-1.36	-1.07
RETURNS(%)	2.82	2.84	3.05	4.40	-0.11	-4.48***
TURNOVER(%)	1.12	0.91	0.93	0.86	4.49***	2.38***

Notes*:* Variable definitions
BV_{t-1} = equity of book value per share at *t-1*, AS_{t-1}= book value of assets per share at *t-1*, LEV_{t-1}= book value of liabilities per share at *t-1*, E_t= net income per share at *t*, $R\&D_t$= R&D expenses per share at *t*, RD_t= development expenses per share at *t*, BIS= bank for international settlements capital ratio, DEBT= ratio of total liabilities to total equity, GROWTH= growth rate of sales, RETURNS= ratio of net income to net sales, TURNOVER= total asset turnover ratio

Table 3 shows the difference between the High-Tech Industry and Low-Tech Industry after the listing. With regard to stock price (P), book value (BV), Development expenses (RD), R&D expenses (R&D), the mean values in the High-Tech Industry were statistically significantly larger than those in the Low-Tech Industry.[6] With regard to liabilities (LEV) and debt ratio (DEBT), the Low-Tech Industry evidences higher prices than the High-Tech Industry. Therefore, the High-Tech Industry can be considered more financially stable. Additionally, in the case of the Bank for International Settlements capital ratio (BIS), both the average and the median of High-Tech Industry evidenced high prices.

IPO Firm's R&D Expenses and Value Relevance Verification

Table 4 presents the correlations among major variables. The stock price (P), which is reflective of Firm Value, is significantly positively correlated with all variables, except for liabilities (LEV). Specifically, it evidences a correlation of 0.3349 with the book value (BV); a correlation of 0.2231 with the net income (E), a correlation of 0.2849 with the total assets (AS), and a correlation of -0.1949 with liabilities (LEV). R&D expenses (R&D), a major explanatory variable in this research, evidenced a positive correlation of 0.3082, and Development expenses (RD) was correlated at 0.1336.

Table 4 Correlation Coefficients

	P_t	BV_{t-1}	AS_{t-1}	LEV_{t-1}	E_t	$R\&D_t$
BV_{t-1}	0.335*** (0.000)					
AS_{t-1}	0.285*** (0.000)	0.522*** (0.000)				
LEV_{t-1}	-0.195*** (0.000)	0.216*** (0.000)	0.848*** (0.000)			
E_t	0.223*** (0.000)	0.263*** (0,000)	0.204** (0.043)	-0.060 (0.129)		
$R\&D_t$	0.308*** (0.000)	0.144*** (0.000)	0.142*** (0.000)	0.122*** (0.002)	0.096** (0.016)	
RD_t	0.134*** (0.000)	0.191*** (0.000)	0.240*** (0.000)	0.248*** (0.000)	0.018 (0.644)	0.076* (0.056)

Notes*:* Variable definitions
BV_{t-1} = equity of book value per share at *t-1*, AS_{t-1}= book value of assets per share at *t-1*, LEV_{t-1}= book value of liabilities per share at *t-1*, E_t= net income per share at *t*, $R\&D_t$= R&D expenses per share at *t*, RD_t= development expenses per share at *t*, BIS= bank for international settlements capital ratio, DEBT= ratio of total liabilities to total equity, GROWTH= growth rate of sales, RETURNS= ratio of net income to net sales, TURNOVER= total asset turnover ratio

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Table 5 provides the analysis results confirming the value relevance of the IPO firm. Model 1, which was analyzed using Ohlson's(1995) Model, represents a positive correlation in which the net income (E)'s regression coefficient is 0.700, and the book value (BV) is 0.442. Assessments of the relevance between R&D Expenses and Firm Value begin with the notion that paid R&D Expenses can improve future firm value and business outcomes by facilitating the development of new products or services, as well as by improving the firm's existing products and services. Model 2 is the model that verified the value relevance of the modified net income (AE), which is a combination of net income (E) R&D expenses (R&D), and book value (BV). The PERs to book values (BV) and Modified net income (AE) were 0.421 and 0.626, respectively. However, the PER to R&D Expenses was 13.185, and the explanatory power of the model also increased by approximately 4%, relative to Model 1.

Table 5 IPO Firm's Value Relevance

Model 1 $P_t = b_0 + b_1BV_{t-1} + b_2E_t + b_3NEGE_t + b_4\sum_k YR_{kt} + e_t$

Model 2 $P_t = b_0 + b_1BV_{t-1} + b_2AE_t + b_3R\&D_t + b_4NEGE_t + b_5\sum_k YR_{kt} + e_t$

	Model 1		Model 2	
	Coefficient	*t*-statistics	Coefficient	*t*-statistics
BV_{t-1}	0.442	7.30***	0.421	7.14***
E_t	0.700	3.02***		
AE_t			0.626	2.78***
$R\&D_t$			13.185	5.68***
$NEGE_t$	-0.530	-1.41	0.480	-1.31
YR Dummies	Not Reported		Not Reported	
Adj R^2	0.323		0.360	

Notes*:* Variable definitions

P_t = market value at the three months after fiscal year *t,* BV_{t-1} = equity of book value per share at *t-1*, E_t = net income per share at *t*, $R\&D_t$ = R&D expenses per share at *t*, $NEGE_t = E_t$ when E_t is negative, and 0 otherwise, YR_{kt} = 1 when the data belong to year k, and 0 otherwise (k=1990, 1991.....2005).

Table 6 provides the analysis result that confirms the hypotheses of this study. According to Model 3, whereas the PER to the High-Tech Industry's outlay for R&D expenses was measured at 13.825, the PER to the Low-Tech Industry was measured at -9.846; thus, Hypothesis 1 is supported. This finding indicates that upon the evaluation of firm value in the market, the effect of the High-Tech Industry's R&D expenses on firm value is larger than that of the Low-Tech Industry. According to the results generated by Model 4, the PER to the outlay for R&D expenses of the firm with a high sales growth rate was 20.043, but the PER to the firm with a low sales growth rate was 7.414. This result supports Hypothesis 2, and we can also observe that the

outlay for R&D expenses of the firm with a high sales growth rate, which reflects growth in the market, is profoundly influential with regard to firm value. Additionally, according to the results of Model 5, the PER to the outlay for the R&D expenses of a firm with a high market value ratio relative to the book value was 23.036, but the PER to the firm with a low market value ratio relative to the book value was -21.515. This finding supports Hypothesis 3.

According to the results of literature reviews, the stock market's evaluation is more predominantly positive in capitalizing the outlay for intangible assets than in covering the costs (Sougiannis, 1994; Chambers, Jenning & Thompson, 2002). Therefore, the stock market's evaluation should also be more positive in terms of capitalizing the outlay on the firm's R&D expenses than in terms of covering the current cost. That is, with regard to capitalizing the expense item of R&D expenses in full, the value relevance of the modified profits and net assets would be expected to increase. In Table 7, Model 6's regression coefficient of capitalized Development Expenses (RD) was 2.484, and the regression coefficient of paid R&D Expenses (R&D) was 12.765; this reflects significant relevance at a significance level of 1%.

Table 6 The Influence of IPO firm's R&D Expenses on Firm Value[7]

Model 3 $P_t = b_0 + b_1BV_{t-1} + b_2AE_t + b_3R\&D_t + b_{41}R\&D_t*DUM1 + b_5NEGE_t + b_6\sum_k YR_{kt} + e_t$

Model 4 $P_t = b_0 + b_1BV_{t-1} + b_2AE_t + b_3R\&D_t + b_{42}R\&D_t*DUM2 + b_5NEGE_t + b_6\sum_k YR_{kt} + e_t$

Model 5 $P_t = b_0 + b_1BV_{t-1} + b_2AE_t + b_3R\&D_t + b_{43}R\&D_t*DUM3 + b_5NEGE_t + b_6\sum_k YR_{kt} + e_t$

	Model 3		Model 4		Model 5	
	Coefficient	*t*-statistics	Coefficient	*t*-statistics	Coefficient	*t*-statistics
BV_{t-1}	0.419	7.14***	0.430	7.33***	0.477	8.70***
AE_t	0.644	2.87***	0.567	2.53**	0.715	3.43***
$R\&D_t$	-9.846	-1.15	7.414	2.53**	-21.515	-5.36***
$R\&D_t$*DUM1	23.671	2.80***				
$R\&D_t$*DUM2			12.629	3.19***		
$R\&D_t$*DUM3					44.551	10.23***
$NEGE_t$	0.510	-1.40	-0.431	-1.19	-0.577	-1.71*
YRDummies	Not Reported		Not Reported		Not Reported	
Adj R^2	0.367		0.370		0.453	

Notes*:* Variable definitions

P_t = market value at the three months after fiscal year *t,* BV_{t-1} = equity of book value per share at *t-1*, AE_t = net income per share at *t* + R&D expenses per share at *t*, $R\&D_t$ = R&D expenses per share at *t*, DUM1 = According to Industrial Classification, the High-Tech Industry is 1, and the Low-Tech Industry is 0, DUM2 = 1 if a firm group's growth rate of sales is higher than median, and 0 otherwise, DUM3 = 1 if firm group's market value ratio contrast to book value is higher than the median, and 0 otherwise, $NEGE_t = E_t$ when E_t is negative, and 0 otherwise, $YR_{kt} = 1$ when the data belong to year k, and 0 otherwise (k=1990,1991.....2005).

Model 7 first classifies the High-Tech Industry and Low-Tech Industry, and then shows results of the analysis of the relative differences in the relevance of each R&D expenses' value. The regression coefficient of the capitalized development expenses (RD), which correlates to the High-Tech Industry, is -6.686, and evidences negative relevance at a significance level of 1%. However, the regression coefficient of the cost-covered R&D Expenses (R&D) was 24.494, and this is deemed to be positively relevant. These results imply that the R&D Expenses covered in the High-Tech Industry evidence higher value relevance than in the Low-Tech Industry.

CONCLUSIONS

The principal objective of this research was to confirm the influence of IPO Firm's R&D Expenses on Firm Value, making use of firm financial materials both prior to and after the listing, with emphasis placed on IPO firms listed on the stock market after 1990. The findings of our empirical analysis, which was carried out on 631 sample firms that made their IPOs from 1990 to 2005, were as follows. Regarding the results of comparison of financial outcomes prior to and after the first IPO, total assets, total liabilities, earnings and R&D Expenses after the listing were all significantly lower than prior to the listing. The BIS and debt ratios, both of which reflect firm stability, show that the firm's stability was enhanced after the listing. Additionally, the growth rate of sales (reflective of growth), the ratio of net income to net sales (reflective of profitability), and the total asset turnover ratio (reflective of activity), were all reduced after the listing.

It should be noted that the classifications of High-Tech Industry and Low-Tech Industry, as well as comparative analysis of the financial outcomes, in this paper were implemented in accordance with the guidelines of the OECD Standard Industrial Classifications. Using those metrics, the High-Tech Industry's stock prices, book values, earnings, and R&D expenses were all determined to be higher than those of the Low-Tech Industry. The BIS and debt ratio, both of which are reflective of firm stability, indicate that the High-Tech industry is also more stable than the Low-Tech Industry. Additionally, the growth rate of sales, which is reflective of growth, and the ratio of net income to net sales, which is reflective of profitability, were both higher in the High-Tech Industry than in the Low-Tech Industry; however, the Low-Tech Industry's total asset turnover ratio, which is reflective of firm activity, was higher than that of the High-Tech Industry. Third, our analysis of the IPO firm’s R&D expenses on firm value showed that its effects were positive. According to our hypothetical estimates, in the case of IPO firms, the PER to the outlay for R&D Expenses of the High-Tech Industry was significantly higher than that of the Low-Tech Industry. This finding supports Hypothesis 1, and demonstrates that the High-Tech Industry's R&D expenses have greater information content for the explanation of firm value than do the Low-Tech Industry’s R&D expenses. Additionally, in the case of IPO firms, PER to the outlay for R&D expenses of a firm with a high sales growth rate is expected to be higher than for a firm with a low sales growth rate. Thus, Hypothesis 2 is supported.

Additionally, in the case of IPO firms, the PER to the outlay for R&D expenses of a firm with a high market value ratio relative to its book value shows that it is priced higher than a firm with a low market value ratio. This supports Hypothesis 3. Finally, the modified profit and paid R&D expenses (R&D), as well as the modified book value and the capitalized development expenses (RD), all positively influenced firm value. Moreover, as the consequence of analyzing the R&D expenses (R&D) and Development expenses (RD) after correlation with the dummy variable (used to classify High-Tech Industry and Low-Tech Industry), paid R&D expenses (R&D) evidenced higher value relevance in the context of the High-Tech Industry.

Table 7 The Influence of IPO firm's R&D Expenses and Development Expenses on Firm Value

Model 6 $P_t = b_0 + b_1AABV_t + b_2RD_t + b_3AE_t + b_4R\&D_t + b_5NEGE_t + b_6\sum_k YR_{kt} + e_t$

Model 7 $P_t = b_0 + b_1AABV_t + b_2RD_t + b_3RD_t*DUM1 + b_4AE_t + b_5R\&D_t + b_6R\&D_t*DUM1 + b_7NEGE_t + b_8\sum_k YR_{kt} + e_t$

	Model 6		Model 7	
	Coefficient	*t*-statistics	Coefficient	*t*-statistics
$AABV_{t-1}$	0.391	6.53***	0.351	5.78***
RD_t	2.484	3.06***	7.974	3.94***
AE_t	0.653	2.91***	0.624	2.80***
$R\&D_t$	12.765	5.51***	-10.211	-1.20
RD_t*DUM1			-6.686	-3.06***
$R\&D_t$*DUM1			24.494	2.91***
$NEGE_t$	-0.497	-1.36	-0.467	-1.30
YR Dummies	Not Reported		Not Reported	
Adj R^2	0.366		0.380	

Notes*:* Variable definitions
P_t = market value at the three months after fiscal year *t,* $AABV_t$ = equity of book value per share at *t* - net income per share at *t* - development expenses per share at *t,* RD_t = development expenses per share at *t,* AE_t = net income per share at *t* + R&D expenses per share at *t*, $R\&D_t$ = R&D expenses per share at *t*, DUM1 = According to Industrial Classification, High-Tech Industry is 1, and Low-Tech Industry is 0, $NEGE_t = E_t$ when E_t is negative, and 0 otherwise, YR_{kt} = 1 when the data belong to year k, and 0 otherwise (k=1990,1991.....2005).

The findings of this study outline some important implications for the value evaluation of IPO firms' R&D expenses, which have not previously been actively studied in a domestic context. The influence of R&D expenses on firm value, which appears to have great power to generate future economic benefits, also has positive value relevance in IPO firms. Analyses of the differences in value relevance between the High-Tech and Low-Tech Industries are important in understanding the nature of these industries; another important issue is the analysis of the

value relevance between growth rate of sales and market value ratio in contrast to the book value.

However, this research is critically limited in that it cannot predict in advance the firm's value relevance, and thus requires analysis via *ex post facto* estimations. Moreover, as is shown in the studies conducted by Lev and Sougiannis(1996), the outlay for R&D expenses is influential not only in the present term, but also over a long period into the future. However, in this study, only 5 years of materials, including the listed year, targeted toward IPO firms from 1990 to 2005 were included as subjects for analysis, and further analyses of the value relevance of R&D Expenses over a longer-term period will be necessary in future studies.

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ENDNOTES

[*] The results of the research conducted as a foreign visiting researcher at the Economic Research Center of the Graduate School of Economics in Nagoya University

[1] Since 2000, Korea R&D expenses have increased 2.06 times, from 10.2547 trillion won to 21.1268 trillion won, and within the same period, R&D expenses of the High-Tech Industry have increased 2.25 times, from 5 trillion to 11 trillion won. Korean firms' average annual rate of increase in R&D Expenses are 12.8%, but within the same period, the rate of increase in the High-Tech Industry is outstanding: High-Tech 14.5%, Medium High-Tech 15.9%, Medium Low-Tech 9.4%, and Low-Tech 4.7%. Additionally, the importance of the High-Tech Industry among total firms' R&D Expenses has risen steadily, accounting for 53.8% in 2006; conversely, the importance of the Low-Tech Industry fell slightly (KISTEP, Structural Analysis on R&D Expenses of Industry).

[2] The book value of equity (BV) is decomposed into assets (AS) and liabilities (LEV), as a consequence of analyzing the effects of respective variables on firm value, AS and E positively affect firm value. However, LEV negatively affects the firm value.

[3] According to Ben-Zion (1978), an increase in R&D Expenses and Advertising Expenses of the firm induces increases in the market value and book value of each firm. Additionally, Hall (1993) has reported

that R&D investment contributes to firm's profitability improvement and value creation, and its contribution can be differentiated by industry, period, and business scale.

[4] Relisting refers to the relisting of the stock, if 5 years have not passed after listing; listing the stock of the firm, established by Split or Split and Merge from a stock-listed corporation; or listing the stock of the firm, established by the merger of stock-listed corporations.

[5] For example, the final sample of the firm listed in 1990 is the selection of firms among a set of firms that have financial materials available from 1990 to 1994; in 1991, financial materials were selected from 1991 to 1995. That is, if all the financial materials of the 30 firms listed in 1990 are available, a total of 150 samples were selected. However, in this data, only 73 samples of the financial materials of a total of 17 firms were available in 1990. Additionally, the use of financial materials was possible up to the data of 2007, and years 2004 and 2005 used only 4-year and 3-year materials, respectively.

[6] In the case of Development expenses (RD), such results were attributed to the fact that the samples utilized for the difference analysis included many samples for which the development expense (RD) was 0. The total number of samples was 269 after analysis, excluding firms with development expenses (RD) of 0. The Low-Tech Industry's average (median) of development expenses (RD) was 479(97), and the High-Tech Industry's average (median) was 831(346). Moreover, after verifying the difference, the value of t was -2.06(on 5% significance level), and the value of Z was -4.00(on 1% significance level).

[7] Due to the nature of domestic firms, the financial position and business environment during the East Asian Financial Crisis differed from those of other periods. In this research, considering this fact, the analysis results (not counting 1997 and 1998, during the East Asian Financial Crisis) were as follows:

	Excluding period of IMF(n=554)		
	Model 3	Model 4	Model 5
BV_{t-1}	0.449(7.40***)	0.465(7.65***)	0.501(8.96***)
AE_t	0.575(2.53**)	0.506(2.23**)	0.631(3.03***)
$R\&D_t$	-8.485(-0.97)	10.347(3.39***)	-24.388(-5.49***)
$R\&D_t$*DUM	25.341(2.92***)	12.395(2.99***)	49.082(10.45***)
Adj R^2	0.271	0.271	0.385

CORPORATE GOVERNANCE AMONG BANKS LISTED IN THE PHILIPPINE STOCK EXCHANGE

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ABSTRACT

The lack of corporate governance is one of the reasons cited for the global financial crisis of 2008. Many commercial banks and investment banks worldwide collapsed or were bailed out by governments. Philippine banks, however, were able to minimize the impact of the global crisis since they already had the reforms on corporate governance. These reforms were instituted after the 1997 Asian financial crisis. The paper focuses on the determinants of corporate governance of selected banks listed in the Philippine Stock Exchange. We consider insider ownership and board size as proxies for corporate governance. We established the relationships of bank size, age, non performing loan ratio, earnings per share, return on average assets, return on average equity with corporate governance.

INTRODUCTION

Asian central banks initiated corporate governance reforms among banks as an aftermath of the 1997 Asian Financial crisis. By 2008, when the global financial crisis set in, corporate governance reforms already in place among Philippine banks provided safety nets which minimized falling asset prices and losses.

Since 2002, listed companies in the Philippines have been required to discuss their adoption of best practices in Corporate Governance in their annual reports on SEC Form 17-A submitted to the Securities and Exchange Commission (SEC).

This paper evaluates corporate governance among banks listed in the Philippine Stock Exchange (PSE) from the period 2005-2009. Our main goal is to investigate the determinants of corporate governance and the dynamics of their relationship to corporate governance. Thus, we will test the following hypotheses:

HYPOTHESES

HI: *Corporate governance (as proxied by insider ownership) has a significant relationship with an independent board of directors, bank size, return on assets (ROA), return on equity(ROE), earnings per share (EPS), age, and non performing loans ratio (NPL).*

H2: Corporate governance (as proxied by board size) has a significant relationship with an independent board of directors, bank size, return on assets (ROA), return on equity(ROE), earnings per share (EPS), age, and non performing loans ratio (NPL).

LITERATURE REVIEW

Jensen and Meckling (1976) agency theory discussed that agents or managers perform functions on behalf of shareholders. However, these agents or managers will prioritize maximizing his wealth ahead of the shareholders' value since his compensation is tied to managerial performance. Thus, Jensen and Meckling (1976) discussed that internal and external monitoring costs are incurred to minimize conflict of interest. As Elsayed (2007) cited Johnson *et al*. (1996), the board of directors' main functions are: *"monitoring management actions, advising the CEO and getting external resources that are vital to build corporate capabilities* (p. 1204)."

Elsayed (2007) defined the total number of directors on the board as the measure of board size. El Mehdi (2007) showed that board size is positively related to corporate governance which means a larger board would have more directors to monitor agency problems, review management actions, bring greater opportunities. The presence of independent directors in the board enhance board governance, reduce financial statement fraud, increase transparency and disclosure, and protect minority shareholders. (Leung and Horwitz, 2004). However, El Mehdi cited Jensen (1993) that there is an upper limit to boards, which is eight directors, as more than this will affect group dynamics and board performance. On the other hand, El Mehdi (2007) and Barucci and Felini (2005) cited that there is a large literature establishing a negative relationship between board size and firm performance; see Hermalin and Weisbach (2001), Yermack (1996) and Barucci and Ceccacci (2005).

Corporate governance literature uses two alternative approaches to measuring corporate performance. The first uses accounting measures of corporate performance. These include return on assets, return on equity and earnings per share. Elsayed (2007) presented that return on assets is net profit divided by total assets, which reflects operating results rather than capital structure decisions. The relationship between earnings and managerial shareholdings can be positive (Korczak and Korczak, 2009) or negative (Korczak and Korczak, 2009; Kuznetsov, Kapelyushnikov, Dyomina (2008) at higher levels of managerial shareholdings.

Barucci and Felini (2005) studied the determinants for corporate governance in listed firms in the Italian stock exchange. These included balance sheet data, ownership structure, company performance and qualitative features. They concluded that companies with a large shareholder and/or large minority blockholders have poor governance and protection of shareholders. However, Korczak and Korczak (2009) presented that concentrated holdings of several investors rather than a single large shareholder will result into the blockholders protecting themselves thus making sure that managers and investors' interests are aligned.

Barniv and Bao (2009), Elsayed (2007) discussed the other approach to measuring corporate performance applies market valuation measures, especially the Tobin's q ratio which takes into account risk, return and present value of future profits. Elsayed (2007) presented Tobin's q ratio as:

Tobin's q ratio = [Market Value + Book value of Preference Capital + Book value of Long term Debt + Book value of Inventory + Book value of Current Liabilities – Book value of Current Assets] / [Total Assets] (see Lee and Tompkins, 1999).

Barniv and Bao (2009) defined EPS as earnings per share in their earnings-return regression. Their findings showed that valuation models perform better for companies with a greater analyst following, smaller forecast errors, relatively high public ownership and a strong board structure.

Korczak and Korczak (2009), Kuznetsov, Kapelyushnikov, Dyomina (2008) and Elsayed (2007) introduced control variables such as board size, institutional ownership and management shareholding, firm size, age in the estimated models affecting performance and ownership, so that there will be no specification errors. Size is the logarithm of the firm's total assets. (El Medhi, 2007). Kuznetsov, Kapelyushnikov, Dyomina (2008) defined age as the number of years since the firm was founded. Their results showed that in terms of the control variables, the regression coefficients for the size are positive and significant while the firm's age has proven to be insignificant.

EMPIRICAL ANALYSIS

The study included the following listed banks in the Philippine Stock Exchange: Banco de Oro (BDO), Bank of the Philippine Islands (BPI), China Banking Corporation (CHIB), Metropolitan Bank and Trust Corporation (MBT), Philippine National Bank (PNB), Philippine Bank of Communication (PBC), Rizal Commercial Banking Corporation (RCB), Security Bank (SECB), Union Bank of the Philippines (UBP) from 2005-2009. Most of the banks are traded daily. Also, the following banks: BDO, MBT, BPI, PNB, RCB, UBP, CHIB, belong to the top 10 banks that already comprise 70% - 75% of the total assets of the commercial banking industry. Data was taken from the annual reports and 17-A from years 2005-2009 and from the data set from years 2005-2008 provided by Lagmay, Chong and Lee (2010).

The study used panel data estimations with fixed effects to help control for unobserved heterogeneity. We used the fixed effects since we are not using variances per se but the actual values themselves. Also, stationarity is assumed here. (Lagmay, Chong, Lee, 2010).

The dependent variable in the first model is corporate governance (proxied by insider ownership (io) and the independent variables: independent directors, bank size, age, roe, roa, npl, eps.

The second model has corporate governance (proxied by board size) as the dependent variable and the independent variables are: independent directors, bank size, age, roe, roa, npl, eps.

Table 1: Definition of Variables

Variables	Definition	A priori expectation	Literature
Insider ownership (proxy for corporate governance)	Insider ownership can be represented by the tables in 17-A that show the number of shares of people/parties who can be considered as inside shareholders		
Board size (proxy for corporate governance)	Total number of directors on the board. At least 5 but no more than 15 according to the Revised Code of Corporate Governance of 2009	Positive	El Mehdi (2009)
Independent directors	Minimum of 2 or 20% whichever is lower but at all instances at least 2	Positive	Leung and Horwitz (2004)
Return on average assets (or resources as the case maybe	net income/ average total assets or net income/ average total resources	Positive	Korczak and Korczak (2009) Kuznetsov, Kapelyushnikov, Dyomina (2008)
Return on average equity	Net income/average total equity	Positive Negative	Leung and Horwitz (2004) Yeo et al (2002) and Gul and Wah (2002) as cited by Korczak and Korczak(2009) and Kuznetsov, Kapelyushnikov, Dyomina (2008).
Non performing loan ratio (%)	Non-performing Loans (net of NPLs Classified as Loss)/ Gross Loans (net of NPLs Classified as Loss)	Negative	Lagmay, Lee, Chong (2010)
Earnings per share (basic)	Net income / number of shares outstanding.	Positive	Barniv and Bao (2009)
Size	Log of total assets. Asset sizes are too big to consider for regression. This incorporates possible time lags	Positive	El Medhi, (2007) Kuznetsov, Kapelyushnikov, Dyomina (2008)
AGE	Year when bank was incorporated	Insignificant	Kuznetsov, Kapelyushnikov, Dyomina (2008)

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Table 2: Model1: Fixed-effects, using 45 observations
Included 9 cross-sectional units
Time-series length = 5 Dependent variable: io

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	35.8449	16.1998	2.2127	0.03495	**
bankage	0.0343062	0.0432757	0.7927	0.43437	
independent	-1.2865	1.84776	-0.6963	0.49182	
bank_size	3.12722	1.61087	1.9413	0.06199	*
eps	-0.586091	0.162011	-3.6176	0.00112	***
roa	11.7678	6.21973	1.8920	0.06851	*
roe	-0.408465	0.751113	-0.5438	0.59073	
npl	0.397937	0.376232	1.0577	0.29893	
Mean dependent var	76.31991		S.D. dependent var	11.93490	
Sum squared resid	2898.722		S.E. of regression	9.997796	
R-squared	0.537495		Adjusted R-squared	0.298268	
F(15, 29)	2.246800		P-value(F)	0.029964	
Log-likelihood	-157.5729		Akaike criterion	347.1458	
Schwarz criterion	376.0524		Hannan-Quinn	357.9219	
rho	-0.019295		Durbin-Watson	1.638807	

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(8, 29) = 1.50706
with p-value = P(F(8, 29) > 1.50706) = 0.197902

The first model (Table 2) resulted to the non-significant variables: bank age, independent directors, non performing loans (npl) and return on equity (roe). Bank age is defined as when the bank was founded. The result shows that insider ownership has nothing to do with bank age. This is consistent with Kuznetsov, Kapelyushnikov, Dyomina (2008) study that found bank age to be an insignificant variable in corporate governance. Although, Leung and Horwitz (2004) showed that independent directors have a positive relationship to corporate governance, our results show that it is insignificant and negative relationship. This could be that there are at least two independent board of directors in the bank who may only give advice/suggestions but banks usually have concentrated family ownership. The non performing loan (NPL) is insignificant because this is a result of credit policy administration of the bank while insider ownership set the directions of the bank. NPL is more of the result of the day to day operations of a bank. However, NPL and insider ownership are positively related. This may be explained by some banks having DOSRI (Directors, Owners, Stockholders and Related Interests) loans incurred in earlier years that are non-performing. Over the five-year period, banks were able to reduce their non performing loan ratios.

Return on equity and insider ownership have a negative relationship which is consistent with the findings of Yeo et al (2002) and Gul and Wah (2002) as cited by Korczak and Korczak(2009) and Kuznetsov, Kapelyushnikov, Dyomina (2008). These studies showed that

the association between earnings and managerial ownership is negative at higher levels of managerial shareholdings and at blockholder controlled ownership.

The significant variables include bank size, eps, and return on asset (ROA). Bank size and ROA are positively related to insider ownership while EPS is negatively related. Kuznetsov, Kapelyushnikov, Dyomina (2008) used size as a control variable and their regression coefficients for the SIZE are positive and significant. In this study, the positive relationship between bank size and insider ownership can be a sign that large firms in the sample have larger insider ownership concentration and have better investment capabilities.

The positive relationship between insider ownership and ROA are consistent with Korczak and Korczak (2009),Kuznetsov, Kapelyushnikov, Dyomina (2008). Family controlled firms have higher profitability (as proxied by Return on assets).

Table 3 : Model 2: Fixed-effects, using 45 observations
Included 9 cross-sectional units
Time-series length = 5
Dependent variable: boardsize

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
Const	8.56509	1.97105	4.3454	0.00016	***
Bankage	0.00324843	0.00526541	0.6169	0.54209	
Independent	0.595533	0.224819	2.6489	0.01293	**
bank_size	0.178363	0.195996	0.9100	0.37031	
Eps	-0.100831	0.0197121	-5.1152	0.00002	***
Roa	3.6409	0.756762	4.8112	0.00004	***
Roe	-0.31962	0.0913888	-3.4974	0.00154	***
Npl	-0.019132	0.0457766	-0.4179	0.67907	
Mean dependent var	12.51111		S.D. dependent var	1.740196	
Sum squared resid	42.91232		S.E. of regression	1.216444	
R-squared	0.677943		Adjusted R-squared	0.511362	
F(15, 29)	4.069742		P-value(F)	0.000590	
Log-likelihood	-62.78341		Akaike criterion	157.5668	
Schwarz criterion	186.4734		Hannan-Quinn	168.3429	
Rho	-0.259238		Durbin-Watson	2.010814	

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(8, 29) = 0.948643
with p-value = P(F(8, 29) > 0.948643) = 0.493436

Earnings per share and insider ownership are negatively related. This result is similar to ROE and insider ownership, where there is a negative relationship. As stated earlier, in cases of higher levels of managerial shareholdings in the US, Singapore and Russia, the relationship of earnings and managerial ownership is negative (Korczak and Korczak(2009) and Kuznetsov, Kapelyushnikov, Dyomina (2008).

The results of Model 2 where board size proxies for corporate governance resulted to the following significant variables: Independent directors, EPS, ROA, and ROE. The insignificant variables are bank age, bank size, npl.

Bank age has nothing to do with the board size. The increase in the number of directors is usually for board control although other factors are also taken into consideration. Also, bank size is insignificant because it is the Asset Liability Committee (ALCO) that sets interest rates of the bank, investment policy, pricing issues, liquidity management. ALCO is composed mostly of senior managers of the bank and it is only the bank President/Chief Executive Officer (CEO) that is part of the Board. ALCO reports to the board their policies, if there are changes, they will be prospective rather than retrospective. ALCO meets regularly (once a week) as compared to the board that meets only twice a month

NPL, similar to bank size is insignificant. NPL is a result of day to day operation of any bank although the board sets the strategic directions.

Independent directors, as a variable, is significant, implying that the more independent directors in the board, the greater the ability to monitor activities of management and protect shareholders' interest and enhance corporate governance.(Leung and Horwitz 2004). They can offer other viewpoints or /strategies than what the bank may be used to. Independent directors also serve as a deterrent to immediate and costly reactions during the crisis.

Earnings, returns ratio (EPS, ROA, ROE) are significant. However, ROE and EPS are negatively related to board size. Listed Philippine banks are often characterized as having concentrated ownership by insider ownership, a majority is part of the board of directors. As individual insider ownership, there is a clear representation of ownership. However, as individuals who are part of institutions that are also insider ownership, the representation of ownership may not be clear. As earlier stated, only the President/CEO is part of the ALCO, thus, there is board representation in the decisions that affect ROE and EPS. The findings on ROE and EPS are consistent with Leung and Horwitz (2004)findings where East Asian firms have high concentrated ownership resulting to lower informativeness of earnings as reflected in the earnings-return relation.

In 2008, the global financial crisis sent banks and investment banks either declaring bankruptcy or being bailed out. For the Philippine banking system, the Bangko Sentral ng Pilipinas (BSP) reported that only the banks with collaterized debt obligations were affected by the crisis and not one collapsed as a result of the crisis. After the 1997 Asian Financial Crisis, Asian banks adopted reforms particularly on corporate governance. Initially, there was resistance to corporate governance since banks in Asia are owned by taipans or families. Eventually, banks adopted leading practices and principles of corporate governance. These included transparency, accountability, fairness/equity, risk management, independent board of directors. These corporate governance practices cushioned the impact of the global financial crisis for Philippine banks.

SUMMARY AND CONCLUSION

The paper analyzed the relationship of corporate governance with bank size, age, non performing loan ratio, earnings per share, return on average assets, return on average equity and independent directors. Our findings showed that corporate governance as proxied by insider ownership has significant relationship with ROA, bank size and EPS. Both bank size and ROA are positively related while EPS is negatively related to corporate governance. And we summarized that corporate governance as proxied by board size has significant relationship with independent board, EPS, ROA and ROE. Both independent board and ROA are positively related while EPS and ROE are negatively related to corporate governance.

Philippine banks were minimally affected by the Global Financial Crisis in 2008 since they have corporate governance structures in place. The findings showed that the presence of independent directors in the board suggests effectiveness in increasing disclosure, transparency, enhancing corporate governance. Also, the reduction of non-performing loans ratios over the years since the 1997 Asian Financial Crisis showed that banks monitor the quality of their loans, disposing of the non performing assets through special asset vehicles. Philippine banks are cautious about lending and exposures to risky assets which is why they were minimally affected by the Global financial crisis.

Although ownership of Philippine banks is still largely concentrated, it is not a deterrent against improving corporate governance which resulted to higher profitability. With greater transparency demanded of them, Philippine banks focus more on coming up with client friendly products and services instead of simply increasing their asset size just to be the biggest but without concern for good corporate governance.

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EMPIRICAL EVIDENCE ON FORMAL AND MATERIAL HARMONIZATION OF NATIONAL ACCOUNTING STANDARDS

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ABSTRACT

This paper empirically measures and compares the levels and progress of formal and material harmonization in Indonesia. It reveals the extent of harmonization Indonesian Accounting Standards (PSAK) with International Financial Reporting Standards (IFRS) and the improvement of that extent (de jure or formal harmonization). Additionally, it also uncovers the degree of the comparability of Indonesian companies' choices of accounting treatments and the improvement of that degree (de facto or material harmonization). Formal harmonization is measured by assessing 43 accounting methods of 18 accounting standards of International Financial Reporting Standards (IFRS) 2007 and their corresponding standards in Indonesian Accounting Standards (PSAK) 2003 and 2007, applying Jaccard's Coefficients, Spearman's Correlation Coefficients, Euclidean Distances, and Chi-square statistics. Using the same accounting methods, material harmonization is measured by examining 2004 and 2008 financial statements of 100 listed Indonesian companies and applying H index, C index, and Chi-square statistics.

This paper finds that the extents of formal and material harmonization are high, although some divergences still occur. However, the improvement of formal harmonization is not followed by that of material harmonization.

INTRODUCTION

Although the numbers of studies on formal (de jure) and material (de facto) harmonization have increased recently, little evidence of the relationship between both types of harmonization is produced because traditionally researchers prefer to measure each type of harmonization separately. Some argue that measuring formal harmonization is more preferable because of the growing influence of accounting standards to accounting practices (Fontes, Rodrigues, & Craig, 2005; Garrido, Leon, & Zorio, 2002; Rahman, Perera, & Ganeshanandam, 1996); whereas others prefer to measure material harmonization (Herrmann & Thomas, 1995; Archer, Pascale, & McLeay, 1995; Emenyonu & Gray, 1996; Krisement, 1997; Canibano & Mora, 2000) where much of their work is highly influenced by van der Tas (1988, 1992b) and Tay & Parker (1990, 1992), which maintain that the ultimate concern of harmonization is to increase the comparability of financial reporting. Evidence of the relationship between formal

and material harmonization, if any, show mixed results where most of researchers found that improvement of formal harmonization leads to that of material harmonization (Morais & Fialho, 2008; Peng, 2005).

This paper integrates formal (de jure) and material (de facto) harmonization measurements into one study. Measurement methods used are Jaccard`s Coefficients and Spearman`s Correlation Coefficients (Fontes et al., 2005), Euclidean Distances (Fontes et al., 2005), (Garrido, et al., 2002), H index and C index (van der Tas, 1988, 1992b), and Chi-square statistics (Cooper & Schindler, 2001). The benefits of this research are two-fold. First, it serves as a pioneer of comprehensive preliminary assessment of the levels and the progress of formal and material harmonization of Indonesian Accounting Standards (PSAK), which represents developing countries` accounting standards that have not received sufficient attention from accounting scholars. Second, it provides empirical evidence that contradicts mainstream beliefs, where the progress of formal harmonization does not lead to the improvement of material harmonization.

The International Accounting Standards Board (IASB) will be interested in this paper because there are only few empirical studies on formal and material harmonization of developing countries, especially on Indonesia. The board needs to make certain that its third objective, which is promoting convergence between national accounting standards and International Financial Reporting Standards (IFRS), has been accomplished in developing countries. It can also use the results of this study to better comprehend the extent of harmonization of IFRS among developing economies so that the IASB can devise more suitable strategies and apt accounting standards.

For standards-setting bodies in Indonesia and other developing countries, this study will provide vivid pictures of the positions and improvement of formal and material harmonization of national accounting standards with IFRS. Specifically, it suggests that harmonizing national accounting standards with IFRS might not result in more comparable financial reporting.

Development of Indonesian Accounting Standards

Indonesian Institute of Accountants (IAI) is the only accounting profession body in Indonesia. The institute was established in 1957 in order to govern and coordinate the activities of accountants that comprise financial accountants, management accountants, government accountants, and academic accountants (Foo, 1997). Started with only 30 members, in 2005 the membership grew to approximately 6,000 accountants out of about total 40,000 accountants in Indonesia (Kusuma, 2005). In 2007, the IAI has issued 59 Indonesian Accounting Standards (PSAK) and 6 Indonesian Islamic Accounting Standards in 2007. The latter were internally developed by the IAI, the former were fully and partially adopted and adapted from standards promulgated by the IASB and Financial Accounting Standards Board (FASB), subjected to slight and significant additions and deductions.

There are 4 phases of the development of Indonesian Accounting Standards (PSAK): Prior to 1973, 1973-1984, 1984-1994, 1994 onward. First phase, before 1973, financial reporting requirement was Indonesian Code of Business Law, set up based on Dutch Commercial Code (*Wetboek van Koophandel*) which, also influenced by Napoleonic Code in France (Diga & Saudagaran, 2001). The law did not provide any precise principles of what and how to report a business transaction, rather it only required certain accounts to be kept (Kusuma, 2005).

Foo (1997) accurately described the second phase of accounting standards development in Indonesia where the earliest were developed and issued at the third IAI Congress in 1973.These standards were known as the Indonesian Accounting Principles (PAI) and modeled upon Accounting Research Study No. 7, Inventory of GAAP7 for Business Enterprises, published by the American Institute of Certified Public Accountants (AICPA) in 1965.

The third phase of accounting standards development was characterized by the increasing demand of more transparent and comparable financial reporting in response to economic reforms and market deregulation, resulted in the enactment of the 1984 Indonesian Accounting Standards that were upgraded in term of eliminating harmonization time lag with US GAAP and widening the scope of the standards in order to reflect progress in the US GAAP.

The fourth phase was the turning point of the development of Indonesian Accounting Standards. Before this phase, the standards were referenced to the US GAAP. However, in the Seventh 1994 IAI National Congress, it was approved that International Accounting Standards (IAS), the predecessor of IFRS, would be use as the principal basis for creating financial reporting standards in Indonesia. The IAI formed Indonesian Financial Accounting Standards Committee (KSAK) and the committee has totally revised 1984 PAI and issued Indonesian Financial Accounting Standards (PSAK). The IAI also decided to harmonize PSAK with IAS because of increasing needs for global accounting standards and increasing competitiveness in global accounting profession. In 1998, Indonesian Financial Accounting Standards Board (DSAK) superseded KSAK. At that time, PSAK was revised twice: in October 1995 and June 1996. DSAK further amended existing standards in June 1999, April 2002, and September 2007 (Indonesian Institute of Accountants, 2002).

Related Study on Indonesian Accounting Standards

However, the efforts to move PSAK closer to IFRS have not yielded expected outcomes. Andersen, et al. (2001) revealed that PSAK differs from IFRS in several aspects. First, PSAK did not address the recognition and measurement of financial assets, accounting for employees benefits other than pensions, and the splitting of an issuer‘s compound financial instruments into debt and equity components. Second, there were no specific rules requiring disclosures of the first-in-first-out or current cost of inventories valued under last-in-first-out, the fair values of financial assets and liabilities, and segment reporting of liabilities. Third, there were inconsistencies between PSAK and IFRS that could cause different treatments in certain areas,

namely investment properties, foreign exchange losses, different criteria for classifying leases, and the initial event for disclosures relating to discontinuing operations (Andersen, et al., 2001). One year later, Indonesia was regarded as a country that has complicated nature of particular accounting standards, (BDO, Deloitte, EY, GT, KPMG, & PWC, 2002).

In 2005, Kusuma described that PSAK was referenced from IFRS (28 standards), the US GAAP (17), the US Accounting Principles Board (2), the US Accounting research Bulletins (1), and created by the IAI (11) (Kusuma, 2005). In 2006, among the standards enacted by the DSAK, 26 standards were referenced from those of IASB, 14 from those of FASB, and the rest, 19 standards, were internally built. The number was not encouraging, only less than 50% of PSAK referred to IFRS. Moreover, from the total 26 standards referenced from IFRS, only 4 PSAKs referred to the newest and revised IFRS, the rests referred to the amended and superseded IFRS9 (Wibisana, 2006). The approximately same composition existed in 2007. Twenty-eight PSAKs were created by reference to IFRS, 20 PSAKs created by reference to US GAAP pronouncements, 8 PSAKs internally developed by the IAI (Sinaga, Thomson, Talampas, & Sutrisno, 2007).

As a result, PSAK as a single pronouncement comprised accounting standards that were originally created by Indonesian standards setter and those that were referred to IFRS and US GAAP. Internally developed standards more likely reflect specific characteristics of Indonesian economic and social system that are not available in the US or in the UK. For instance, growing Islamic Finance needs special reporting standards and criteria for classifying a lease transaction into finance lease might not be same under IFRS and US GAAP. Moreover, PSAK that were referenced to IFRS and the US GAAP were also not comparable. Hence, the mixture of IFRS, US GAAP, and genuine Indonesian Standards in one framework might have detrimental effects on the quality of financial reporting standards and practices in Indonesia.

Additionally, studies by Ford Foundation (1975) and Asian Development Bank (1995) uncovered that in Indonesia there were no accounting and financial systems that have developed to such a degree that they could portray relevant and useful information for analysis. The studies also point out that the legal and accounting system were weak with limited recent attempts at improvement, and do not (strictly) impose accounting requirements and standards to ensure (adequate) financial disclosure (Diga & Saudagaran, 2001).

Previous section makes it clear that the results of harmonizing PSAK with IFRS remain in question. It appears that PSAK lies in the middle of IFRS and US GAAP, compromises the two extremes and at the same time develops its own standards. Although the IAI has revised PSAK six times since 1994, it cannot be cogently judged whether the efforts have successfully harmonized PSAK with IFRS, and convincingly said whether the IAI has been moving into the right direction by more to harmonizing PSAK with IFRS instead of fully adopting it. It also cannot be clearly maintained that based on blur position of accounting standards harmonization in Indonesia, the accounting practices and companies‘ choices of accounting treatments under PSAK have successfully been harmonized.

METHODOLOGY

Harmonization and Standardization

There are two ways to achieve accounting convergence: harmonization and standardization. Although they both reduce accounting differences, the ideas behind them are different. Tay & Parker (1990) clarifies that harmonization is a movement away from total diversity, and harmony is indicated by a concentration of companies around certain accounting methods. On the other hand, standardization is a movement towards uniformity, which does not allow any differences in accounting standards and practices. Thus, harmonization is less strict compared to standardization. In addition, based on level of application, Van der Tas (1988) explains that harmonization of financial reports is called material harmonization whereas harmonization of standards is called formal harmonization.

Thus, the processes, harmonization and standardization at standard-level are formal, whereas harmonization and standardization at practice-level are material. Accordingly, the states, harmony and uniformity could also be classified as formal and material. Combining the strictness of regulation and the application levels in one framework results in eight different concepts as presented in Figure 1.

Figure 1 Harmonization and Standardization Matrix

		Strictness of regulation: High	Strictness of regulation: Low
Application levels	Standard	Formal standardization and uniformity	Formal harmonization and harmony
	Practice	Material standardization and uniformity	Material harmonization and harmony

For the purpose of this study, harmonization is identified as a process to increase the compatibility of different sets of accounting standards and accounting practices. The level of compatibility is assessed by identifying (1) the similarity in the frequency of accounting policy choices among accounting standards, measured by *Jaccard's Coefficients*; (2) the distances among different sets of accounting standards, computed using *Euclidean Distance*, (3) the correlations across different sets of accounting standards, calculated using *Spearman's Correlation Coefficients*, and (4) the concentration around specific accounting policy choices determined by its *Herfindahl* index and *C* index. Other definitions of harmonization that could be found in (Herrmann & Thomas, 1995), (Canibano & Mora, 2000), (Nobes & Parker, 2008), (Nair & Frank, 1981), and (Saudagaran, 2009) also share the same notions.

Checklists and Ranks Assigned

Table 1 shows selected standards under IFRS 2007 and their corresponding PSAK 2007 and 2003. 18 accounting standards are addressed in the study for two reasons. First, they deal with measurement harmonization, which is considered more important by this study because it directly affect the presentation of firms' financial performances. IFRS 2007, PSAK 2007, and PSAK 2003 are selected for formal harmonization; 2004 and 2008 financial reports of 100 top-listed Indonesian firms are sampled for material harmonization.

Table 1: Selected Accounting Standards for Formal and Material Harmonization Measurements

IFRS 2007		PSAK 2003 & 2007	
IFRS 3	Business Combinations	PSAK 22	Accounting for Business Combinations
IAS 2	Inventories	PSAK 14	Inventories
IAS 8	Accounting Policies, Changes in Accounting Estimates and Errors	PSAK 25	Net Profit or Loss in the Current Period, Basic Errors, and Changes in Accounting Policies
IAS 10	Events after the Balance Sheet Date	PSAK 8	Events after the Balance Sheet Date[A]
IAS 11	Construction Contracts	PSAK 34	Accounting for Construction Contracts
IAS 12	Income Taxes	PSAK 46	Accounting for Income Taxes
IAS 16	Property, Plant, and Equipment	PSAK 16	Fixed Assets[B]
IAS 17	Lease	PSAK 30	Rent[C]
IAS 18	Revenue	PSAK 23	Revenue
IAS 19	Employee Benefits	PSAK 24	Employee Benefits[D]
IAS 21	Effects of Changes in Foreign Exchange Rates	PSAK 10	Foreign Currency Transaction
IAS 23	Borrowing Costs	PSAK 26	Borrowing Costs

Table 1: Selected Accounting Standards for Formal and Material Harmonization Measurements			
IFRS 2007		PSAK 2003 & 2007	
IAS 27	Consolidated and Separate Financial Statements	PSAK 4	Consolidated Financial Statements
IAS 28	Investments in Associates	PSAK 15	Accounting for Investments in Associates
IAS 31	Interests in Joint Ventures	PSAK 12	Financial Reporting of Joint Controlled and Joint Operation
IAS 37	Intangible Provisions, Contingent Liabilities and Contingent Assets	PSAK 57	Estimated Liabilities, Contingent Liabilities, and Contingent Assets
IAS 38	Intangible Assets	PSAK 19	Intangible Assets
IAS 39	Financial Instruments: Recognition & Measurement	PSAK 50 & 55	Financial Instrument: Reporting and Presentation[E]; Financial Instrument: Recognition and Measurement[F]

Note:
[A] In PSAK 2003: Contingency and Events after The Balance Sheet Date.
[B] In PSAK 2003: Fixed Assets and Other Assets
[C] In PSAK 2003: Accounting for Lease
[D] In PSAK 2003: Accounting for Retirement Benefits
[E] In PSAK 2003: Accounting for Investment in Certain Financial Instruments
[F] In PSAK 2003: Accounting for Derivatives and Hedge

These standards are broken down to 43 accounting issues and 77 accounting methods, similar to those used by (Fontes, et al., 2005). PSAK 2003 is Indonesian Accounting Standards enacted per 1 January 2003, PSAK 2007 is Indonesian Accounting Standards per 1 September 2007, and IFRS 2007 is International Financial Reporting issued per 1 January 2007.

Table 2
CLASSIFICATION AND DESCRIPTION OF RANKS

Rank	Strength of Recommendation	Description
1	Required	An accounting practice is required by an accounting standard
2	Recommended	More than one accounting alternative exists
3	Allowed	An accounting practice is permitted by an accounting standard, or it is a minority practice, or it is in existence in special case only
4	Forbidden	An accounting practice is forbidden by an accounting standard
5	Not Available	Issue is not addressed, or it is not clear whether it has been eliminated or changed from previous standard

For formal harmonization, a checklist is created to serve as a basic entry for each of selected issues (total 43 issues and 77 items) under IFRS 2007, PSAK 2007 and 2003. After that, a rank of strength, reflecting the requirements under three different accounting standards, is assigned for each item. This paper applies 5 ranks as illustrated in Table 2, which is adapted from several types of rank used in previous researches, such as in (Fontes, et al., 2005), (Garrido, et al., 2002), (Rahman, et al., 1996), (Doupnik & Taylor, 1985), (McKinnon & Janell, 1984), and (Nair & Frank, 1981).

For material harmonization, two checklists are created to capture firms' choices of accounting policies in 2004 and 2008, comprising selected accounting methods under PSAK 2007 and PSAK 2003. The checklist of PSAK 2007 is filled with companies' choices of accounting methods in 2008. In the same way, the checklist of PSAK 2003 is filled with companies' choices of accounting methods in 2004. The one-year adjustment is needed to ensure that the new enacted accounting standards in 2003 and 2007 were put into practices in 2004 and 2008. Value "1" is assigned to an accounting method if it is written in the footnotes of financial statement. Value "0" is assigned if it is not written. The examination of footnotes is focused on the section "major accounting policies" of financial reports.

Measurement Tools

Jaccard's Coefficients and *Spearman's Correlation Coefficients* are used to measure the level of formal harmonization. *Euclidean Distances* and *Chi*-square statistics are used to measure the progress of formal harmonization. *H index* and *C* index are used to measure the level of material harmonization. *Chi*-square statistics are used to measure the progress of material harmonization.

Jaccard's Coefficient is defined as:

$$S_{ij} = \frac{a}{a+b+c}$$

Where:

- S_{ij} = the similarity between two sets (i.e., it denotes the relationship between the number of characteristics simultaneously present and absent in both sets and the total number of characteristics), ranging from 0 to 1;
- a = number of characteristics taking a value of 1 in both sets;
- b = number of characteristics taking value of 1 in the *j*th set and 0 in the *i*th sets;
- c = number of characteristics taking a value of 1 in *i*th set and 0 in the *j*th set.

Two approaches, with and without rank and strength consideration are used. The latter assigns value "1" to rank 1, 2, and 3; and value "0" to rank 4 and 5. The former assigns value "1"

to an accounting method that is used and is assigned with a rank that is greater or equal to its corresponding method of different sets of standards; and assigns value "0" if an accounting method is not used or is used but is assigned a lower rank compared to its corresponding method of different sets of standards.

Spearman's Correlation Coefficient is defined as:

$$r_s = \frac{\sum_{i=1}^{n} R(NC_i)R(IC_i) - n\left(\frac{n+1}{2}\right)^2}{\left(\sum_{i=1}^{n} R(NC_i)^2 - n\left(\frac{n+1}{2}\right)^2\right)^{\frac{1}{2}}\left(\sum_{i=1}^{n} R(IC_i)^2 - n\left(\frac{n+1}{2}\right)^2\right)^{\frac{1}{2}}}$$

Where:

r_s = the Spearman's Correlation Coefficient, ranging from -1 to +1

n = total number of accounting methods included in the sample;

$R(NCi)$ = rank order in terms of strength of recommendation of accounting method i of a national accounting standards, where $i = 1, \ldots, n$;

$R(ICi)$ = rank order in terms of strength of recommendation of accounting method i of International Accounting Standards / IFRS, where $i = 1, \ldots, n$.

Before *Spearman's Correlation Coefficients* of each method is calculated, rank order is directly derived from assigned ranks in the checklist. If there are two or more similar ranks of accounting methods exist, the average rank order is used.

The *Euclidean Distance* for any pair X, Y, with coordinates $X = (x1, x2, x3, \ldots, xk)$ and $Y = (y1, y2, y3, \ldots, yk)$ is defined as:

$$D(X,Y) = \left[\sum_{k=1}^{p}(x_k - y_k)^2\right]^{\frac{1}{2}}$$

Where:

$D(X,Y)$ is the Euclidean Distance, which is the distance between X and Y;

xk is the observed value of k-th variable for the individual x in the sample; and

k changes from 1 to p (where p is the vector number order).

The H index or *Herfindahl* index is defined as:

$$H = \sum_{i=1}^{n} p_i^2$$

Where:

H is the *Herfindahl* index, ranging from 0 to 1 or 0% to 100%;
n = number of alternative accounting methods;
p_i = the relative frequency of accounting method i.

The *Herfindahl* index is applied when companies only use one alternative accounting method, for instance to assign cost of sales to inventories, companies usually choose one from four available accounting methods, namely *First-in First*-out (*FIFO*), weighted average cost, *Last-in First-out* (*LIFO*), and Specific identification. On the other hand, C index is implemented to accommodate multiple reporting by a company. For example, a company might use both cost method and equity methods to account for investments in its subsidiaries. Nevertheless, the extent of material harmonization as a result of applying H index or C index on the same accounting issue is expected to be approximately similar (Krisement, 1997).

The C index is defined as:

$$C = \frac{\left(\sum_{i=1}^{i} a_i^2\right) - n}{n^2 - n}$$

Where:

C = is the C index, ranging from 0 to 1 or 0% to 100%;
a_i = the number of companies applying accounting method i;
i = the number of alternative accounting methods;
n = the total number of companies.

The *Chi*-square statistics used in this study is defined as:

$$\chi^2 = \sum_i \sum_j \frac{\left(o_{ij} - E_{ij}\right)^2}{E_{ij}}$$

Where:

χ^2 = the *Chi*-square
O_{ij} = Observed number of cases categorized in the ijth cell
E_{ij} = Expected number of cases under H_0 to be categorized in the ijth cell.

Because the *Chi*-square table in this test contains 2 rows (observed period 2008 and 2004) and 2 columns (value 1 and 0), the *Chi*-square value needs to be corrected for material harmonization measurement. This correction, known as *Yates' correction for continuity* is defined as:

$$\chi^2 = \frac{n\left(\left|AD - BC\right| - \frac{n}{2}\right)^2}{(A+B)(C+D)(A+C)(B+D)}$$

Where:

χ^2 = the *Chi*-square
n = number of cases
A = Observed number of cases categorized in the *1, 1*th cell
B = Observed number of cases categorized in the *1, 2*th cell
C = Observed number of cases categorized in the *2, 1*th cell
D = Observed number of cases categorized in the *2, 2*th cell

RESULTS

Data Description

These following steps are performed to assign ranks and strengths of recommendation to each item. For the first accounting standard evaluated, Inventories, which is broken down further into two accounting issues: assignment costs in inventories and impairment, ranks are assigned to each accounting issue of both costs assignment and impairment. Suppose ranks will be assigned to the former, assignment costs to inventories, where four alternative accounting methods are available: first in first out or FIFO, weighted average, last in first out or LIFO, and specific identification. According to the checklist developed earlier, under IFRS 2007: (1) specific identification is allowed if the cost is not ordinarily interchangeable and goods or services are produced and segregated for specific projects, (2) otherwise, FIFO and weighted average are to be used, (3) LIFO is prohibited. Under PSAK 2007: (1) specific identification is allowed if the cost is not ordinarily interchangeable and goods or services produced and segregated for specific projects, (2) otherwise, LIFO, FIFO, and weighted average are to be used. The descriptions of accounting methods of assigning costs to inventories under PSAK 2003 are similar to those under PSAK 2007.

Based on these descriptions, accounting methods under IFRS 2007, which consist of FIFO, weighted average, specific identification, and LIFO, (the corresponding descriptions of these standards are recommended, recommended, allowed, and forbidden) receive ranks 2, 2, 3,

and 4 respectively. Likewise, those under PSAK 2007 and PSAK 2003 receive ranks 2, 2, 3, and 2. Similar processes are conducted for the rest of the accounting methods. Once this step is completed, the tests of formal harmonization could be started.

Table 3
RANKS ASSIGNED TO IFRS AND PSAK

Rank	Strength of Recommendation	IFRS 2007		PSAK 2007		PSAK 2003	
		No	%	No	%	No	%
1	Required	24	31	22	29	21	27
2	Recommended	29	38	31	40	23	30
3	Allowed	12	16	14	18	12	16
4	Forbidden	8	10	7	9	7	9
5	Not Available	4	5	3	4	14	18
	Total	77	100	77	100	77	100

Table 4
SELECTED SAMPLE'S INDUSTRIES

Sample's Industries	Numbers of Companies	Percentages of Companies	Percentage of Population's Industry
Consumer Discretionary	16	16	19
Consumer Staples	20	20	15
Energy	2	2	1
Financials	20	20	21
Health Care	4	4	3
Industrials	12	12	13
Information Technology	1	1	3
Materials	22	22	22
Telecommunication	2	2	2
Utilities	1	1	1
Total	100	100	100

Table 3 presents the numbers and percentages of ranks assigned to IFRS 2007, PSAK 2007 and 2003 based on previously mentioned checklist and strength of recommendations. Table 4 exhibits numbers of companies selected and their relative percentages to overall population's industry. The samples are selected based on largest revenues, total assets, and represented industries.

Formal Harmonization Measurement

Based on previously mentioned checklist, *Jaccard's* notations are converted; *Euclidean Distances, Jaccard's Coefficients*, and *Spearman's Correlation Coefficients* are calculated using (1)-(3). Table 5 shows the results of formal harmonization measurements.

Table 5
RESULTS OF FORMAL HARMONIZATION MEASUREMENT

Measurement Methods		IFRS 2007 & PSAK 2007	IFRS 2007 & PSAK 2003	Improvements
Jaccard's Coefficients	- with strength	0.88	0.71	**0.17**
	- without strength	0.91	0.77	**0.14**
Spearman's Correlation Coefficients		0.97	0.96	**0.01**
Euclidean Distances		16.10	34.31	**18.21**

At level of significance 0.1, the critical value of the *Chi*-square with degree of freedom 4 is 7.78 and the *Chi*-square value is 8.48. Thus, it can be observed that the *Chi*-square value is significant where the value is higher than its critical value (8.48 > 7.78), which means the observed frequency of Indonesian Accounting Standards 2007 significantly differs from the observed frequency of Indonesian Accounting Standards 2003.

Material Harmonization Measurement

This paper sets a minimum threshold of 25% for including an accounting standard into material harmonization measurement. If in any year, 2004 or 2008, the companies' choices of an accounting standard reach 25%, they are included into the calculation. After that, 19 of 43 accounting issues are shortlisted for further analysis. The material harmonization of 17 accounting issues is computed by *H* index. That of the remainders is calculated using *C* index because those accounting standards allow companies to have multiple reporting. The remainders are IAS 19 Retirement Benefits: Measurement and IAS 28 Accounting in Associates: Accounting for Investment in Associates in Consolidated Financial Statements. Table 6 presents the results of material harmonization measurement.

Chi-square statistics with continuity correction or *Yate*'s correction shows that at a level of significance 0.1 with degree of freedom 1, the critical value for the *Chi*-square is 2.70 and the *Chi*-square value is 1.54. Because the *Chi*-square value is lower than its critical value, the

distribution of observed frequencies is symmetric. In other words, there is no difference in the frequencies of companies' choices of accounting treatments.

Table 6
RESULTS OF
MATERIAL HARMONIZATION MEASUREMENT

Measurement Methods	PSAK 2007	PSAK 2003	Improvements
H index / C Index	0.87	0.90	**–0.03**

CONCLUSION

In general, the results show that the third objective of the International Accounting Standard Board, promoting convergence between national accounting standards and IFRS, has been accomplished in Indonesia. It also confirms that the efforts of Indonesian standards setter to increase the extent of harmonization of PSAK with IFRS have been successful. However, although the degree of material harmonization is also relatively high, it is found that the improvement in formal harmonization is not followed by the progress of material harmonization. This finding supports the arguments of Van der Tas (1988) and Tay & Parker (1990) who maintain that to certain point, the material harmonization could develop independently from formal harmonization and therefore it is probably more useful to measure material harmonization compared to measure formal harmonization. This study contradicts the findings of (Morais & Fialho, 2008) and Peng (2005) where they contend that a higher formal harmonization would lead to a higher material harmonization.

This study speculates that there are three reasons why in Indonesia, the progress of material harmonization does not follow that of formal harmonization. First, the level of material harmonization might reach its peak and could not be pushed further. Certain extent of discrepancy of both types of harmonization might occur due to lack of enforcement as well as irrational and inconsistent interpretations (Zhang & Lu, 2007). Second, the innate feature of material harmonization that would not enable it to reach the same level and progress of formal harmonization. For example, both Indonesian accounting standards and International financial reporting standards allow two different accounting methods to account for certain transaction. In this case, the level of formal harmonization would high. However, in real practices, the number of companies that choose one of the two methods might more or less equal compared to that that choose another, that is could not be concentrated on one specific method, making the material

harmonization much lower compared to formal harmonization. Third, the progress of material harmonization in Indonesia is indeed poorer than that of formal harmonization because the decision to converge to IFRS is not followed by the business participants and regulator`s commitment to improve transparency and comparability of financial reporting practices.

Furthermore, it should be noted that the extent of material harmonization is more difficult to be improved compared to that of formal harmonization because implementing formally harmonized standards needs more time and efforts than only adopting them (McGee, 2006). The same phenomenon is observed when ten Asian countries were studied in order to compare their level of promulgation and implementation where the reinforcement of standards was lack behind of the enactment of the standards (Barton, Coombes, & Wong, 2004, p. 58).

Several limitations must be taken into the consideration when interpreting the results of this study. First, Assignment of ranks and strengths of Accounting Standards, issues, and methods of PSAK and IFRS involves subjective judgment. Second, there are inherent statistical limitations. For example, Spearman's Correlation Coefficient cannot be applied to evaluate all accounting issues and Chi-square cannot explain the association between variable. Third, the coefficients and numbers obtained cannot be benchmarked due to lack of similar existing studies. Four, the result of evaluation of material harmonization depends on the level of disclosure of annual financial statement. Nonetheless, these limitations do not hinder the significance of this study. The users of financial statements of Indonesian companies would be grateful to find that the levels of formal and material harmonization are relatively high. However, the Indonesian accounting standards setter and the IASB might want to take a closer look on how and why their efforts in harmonizing accounting standards do not result in a higher level of harmonization of accounting practices in Indonesia.

AUTHOR'S NOTE

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A STUDY ON THE SENSITIVITY OF STOCK OPTIONS' PREMIUM TO CHANGES IN THE UNDERLYING STOCK'S DIVIDEND YIELD

Christian Paolo Romagos

ABSTRACT

One of the most popular derivatives today used in the financial markets are options. The holder (buyer) of an option is allowed to walk away from the contract if market factors should become unfavorable and exercise whenever profitable.

Option greeks, or the sensitivity of an option's premium to changes in market factors, are key to successful options trading. Greek parameters on option premium sensitivity to changes in dividend yields have not yet been popularized and its properties have not yet been explored extensively. This paper aims to find a model that will measure the possible change in the stock option's premium whenever the announced dividend yield differ from the one previously paid. This was done by taking the first partial derivative of Merton's extension from the Black-Scholes pricing model of options with respect to the dividend yield variable. The derived changes from this partial derivative were compared to the actual change in the financial markets. In addition, the approximated change using this method was compared to the estimates using the option's delta and the approximated change in the underlying stock.

Simple OLS regression and t-tests were used mainly in the analysis and comparison of the variables involved in the study. Using these techniques, it was found that the derived partial derivative proves to be a significant estimator of the change of the option's price. Further, it was also found that this method of approximation has less error when compared to the actual, versus the estimates using the option's delta and the expected change in the underlying stock.

INTRODUCTION

Financial derivatives have been an integral part of the financial markets in the last few decades. Most traders use these derivatives to hedge their existing open positions, reducing their losses whenever the value of the underlying asset should move against their speculative position. Others would use these derivatives to have a determined cash flow in the future, hence reducing the volatility of the overall portfolio.

One of the most popular derivatives today used in the financial markets are options. The unique property of this derivative is that it allows the holder (buyer) of the option to walk away from the contract whenever the situation in the market should become unfavorable while being

able to exercise it whenever profitable. The writer (seller) of the option of course is bound to fulfill his end of the bargain regardless of the profit or loss.

The success and popularity of financial options began in 1973 when the Chicago Board Options Exchange (CBOE) came into operations which standardized stock options in terms of maturity and exercise price (Gemmill 1993). During the same year, the option pricing model popularized by Fischer Black and Myron Scholes,

$$\begin{aligned} Call(S,t) &= SN(d_1) - Xe^{-rt}N(d_2) \\ Put(S,t) &= -SN(-d_1) + Xe^{-rt}N(-d_2) \end{aligned} \tag{1}$$

where

$$d_1 = \frac{\ln\left(\frac{S}{X}\right) + \left(r + \frac{1}{2}\sigma^2\right)t}{\sigma\sqrt{t}} \quad \text{and} \quad d_2 = \frac{\ln\left(\frac{S}{X}\right) + \left(r - \frac{1}{2}\sigma^2\right)t}{\sigma\sqrt{t}} = d_1 - \sigma\sqrt{t} \tag{2}$$

was also publicized which helped in trading of stock options. However one of the biggest shortcomings of the said model at that time was the assumption that the underlying stocks do not pay any dividends. A common adjustment to this model then was to subtract the discounted value of future dividends from the stock price.

A few years later, the model was extended to accommodate more financial market products. This included Fischer Black's extension of the said model to incorporate futures options (1976) and that of Mark Garman and Steven Kohlhagen's extension of the same model to accommodate currency options (1983) and was later on applied to accommodate commodity options as well. Merton later extended the Black-Scholes model to accommodate stock options whose underlying stocks are paying dividends by introducing dividend yield (δ) to the formula.

$$\begin{aligned} Call(S,q,t) &= Se^{-qt}N(d_1) - Xe^{-rt}N(d_2) \\ Put(S,q,t) &= -Se^{-qt}N(-d_1) + Xe^{-rt}N(-d_2) \end{aligned} \tag{3}$$

where,

$$d_1 = \frac{\ln\left(\frac{S}{X}\right) + \left(r - q + \frac{1}{2}\sigma^2\right)t}{\sigma\sqrt{t}} \quad \text{and} \quad d_2 = \frac{\ln\left(\frac{S}{X}\right) + \left(r - q - \frac{1}{2}\sigma^2\right)t}{\sigma\sqrt{t}} = d_1 - \sigma\sqrt{t} \tag{4}$$

This new model assumes that the dividends are paid out at a continuously compounding rate. While this assumption is imperfect, it is usually a reasonable approximation since it would encompass most types of dividend payment frequencies.

From the development of the Black-Scholes model, finance professionals began to analyze the model, specifically on the sensitivity of the model based on changes of the variables of the underlying asset. This formula (equation 1) is clearly a function of five variables: 1) the price of the underlying asset (S), 2) the exercise price (X), 3) the volatility of the underlying asset (σ), 4) the remaining time until the expiration of the options contract (t) in years or a fraction of years, and 5) the risk-free rate (r).

Options sensitivities are the partial derivatives of the generalized Black-Scholes formula which give the sensitivity of the option price to small movements in the five previously mentioned variables of the underlying asset (Haug 1998). These sensitivities are known as "*Greeks*" and the most widely used are: 1) sensitivity of the option to changes in the underlying asset (*Delta*), 2) sensitivity of *Delta* to the movements of the underlying asset (*Gamma*), 3) sensitivity of the option to changes in volatility (*Vega*), 4) change in the option's price to the passage of time or time decay (*Theta*), and 5) the sensitivity of the option to changes in the risk free rate *(Rho)*. Each Greek is used to assess the riskiness of an option for any change in the variables of the underlying asset. While options are mostly used to hedge a speculative position on the underlying asset, advanced traders use these greeks for more effective trading strategies.

Since the Black-Scholes model assumed that the underlying stock do not pay dividends, dividend yield is not a required variable in the pricing of options back then. Perhaps, this is also the reason why the options Greeks known around the world do not include the sensitivity of the option's premium to changes in the dividend yield.

Despite Merton's extended model to accommodate stock options for dividend paying assets, Greek parameter on the sensitivity of options prices to changes in dividend yields have not yet been popularized and its properties have not yet been explored extensively. This paper aims to find a model that will measure the possible change in the stock option's premium whenever the announced dividend yield differ from the one previously paid and try to find its applications in the field of finance.

Merton's extended model had major limitations because of the assumptions that were used. The website www.riskglossary.com/articles/merton_1973.htm *mentions that a problem of the Merton model on stock options with dividends is that it assumes the dividend yield to be a known constant. While often a dividend payment will be scheduled during the life of an option, the amount of the payment has not yet been announced and this serves as an additional source of uncertainty that the Merton model can not reflect. In this study, we shall observe how the prices of stock options change whenever there is a new dividend yield for the underlying stock. We will also try to come up with a model that can approximate this change in the option's premium.*
Alternatively, one can try to measure the effect of a dividend change to an option's premium by looking at the option's delta. Theoretically, a stock's price should decline whenever dividends

are issued. Some models suggest that the dividend yield issued is directly proportional to the possible decline in the stock's value. Thus, one may also try to approximate the change of an overlying option's premium in an indirect manner by first estimating the possible decline in the stock's value and then using the said decline to calculate the effect in the option premium. In short, one can approximate the possible decline in the option for every change in dividends indirectly through the use of the option's delta. Later, we shall compare this method with the one proposed in the previous paragraph and explore which model is more accurate in predicting the possible change in an overlying option's premium.

ASSUMPTIONS OF THE STUDY

Since the model will be derived from the Black-Scholes pricing model for dividend-paying stock options, then the assumptions used in this study will be very similar with the assumptions made by Black and Scholes (assumptions 1 to 7):

1. ***Constant Volatility*** – one of the major drawbacks of the Black-Scholes pricing model is that it assumes volatility to be constant since the volatility is almost always never constant, especially for actively traded stocks. However, since we will be comparing the change in price of stocks or options only between three business days, the assumption of a constant volatility will not be a major factor for the results of this study.
2. ***Continuous compounded interest rates*** – different investment opportunities have different payment frequencies and comparing two assets will sometimes be difficult if their payoff schedule cannot be standardized. Assuming that yields are compounded in continuous time will encompass all types of payment frequencies in any given period.
3. ***Efficient Markets*** – for this assumption, Black and Scholes simply says that prices move randomly and that current prices reflect market's sentiment based on its knowledge on all available information. This will be an important assumption in our study since the change in the price of the option premium will be interpreted as the reaction of the price solely based on the change in the dividend rate.
4. ***Constant interest rates*** – similar to the case of volatility, while this is a limitation of the Black-Scholes pricing model, having a constant interest rate assumption will have a small impact in the study since we will only be comparing the change in the price of the financial assets between three trading periods.
5. ***Lognormally distributed stock prices*** – since we will assume that interest rates will be compounded continuously, the returns will then be normally distributed. Thus, stock prices will be distributed lognormally.
6. ***Liquidity*** – the Black-Scholes pricing model assumes that the market is perfectly liquid and it is possible to purchase and sell any amount of the stock or options or their fractions at any time. We tried not to violate this assumption in our study by choosing the most actively traded option as according to the CBOE website and Bloomberg pages on options.

7. ***Continuously compounded dividends*** – since interest rates are assumed to be compounded in continuous time, then dividend yields will be assumed similarly for consistency. This will provide ease in the comparison of different stocks that might be paying dividends annually, semi-annually or quarterly in our study.
8. ***No inside information on the change in dividends*** – If insiders can act on the change in the underlying stock's dividends, then said stock will be bought or sold by insiders prior to the declaration of the new dividends which could significantly influence the price of the stock and the overlying option prior to the announcement. Hence, the variation in the option's price may not necessarily be reflected from the changes in the variable if this assumption is violated.
9. ***Investors' expectation of unchanged dividends*** – For investors in dividend paying stocks, unless the dividend payments are announced earlier, it is but logical to expect that the firm is likely to issue the same dividends in the future. Hence we shall assume that stock investors expect that the last dividend issuance of the firm will be the same with the next dividend issuance.

REVIEW OF RELATED LITERATURE

Based on the proposition of Modigliani and Miller on dividend irrelevance in 1961, an investor on a stock should not be concerned with the decline in the underlying stock's price since the reduction in price will be offset by the reception of the dividends. However, a holder of a call option does not receive any dividends on the stock and will therefore be concerned in the possible decline of the underlying stock's price. Hence, while the holder of the stock may not necessarily consider the change in dividends to be significant, the option holder on the other hand may be concerned with the variation of dividends. Thus, the sensitivity of the option's price to the movement in dividends will be important to the option holder to assess the riskiness of his asset.

In the absence of a model that could measure the impact of a dividend policy of a stock to an overlying option, it is possible for an investor to simply approximate the decline in the underlying stock's price after a dividend has been paid and instead use the option's delta to approximate the return on the option based on the estimated decline in the underlying stock. However, the paper written by Bowers and Fehrs (1995) on Dividend Buying mentioned that ex-dividend day price drops are on average less than the amount of the dividend paid. There was no mention on the magnitude on how much the decline of the stock price will be underestimated based on the paid dividend. On a separate paper written by Bajaj and Vijh (1995), they concluded that market returns and trading day behavior are accompanied by a positive average excess return. Based on these articles therefore, the use of the option's delta to approximate the new price of the option based on the possible decline in the underlying stock price might lead to some approximation error.

Miller and Folta (2002) wrote an article on timing the entry of holders of call options. They devised a model that will give decisive indications on when to exercise American style options based on a function that includes the variables such as the call price, exercise price, the risk free rates and the dividends of the underlying assets. According to Merton, prior to expiration date, the early exercise of in-the-money call options is not optimal as the act of simply selling the call option to the secondary market would result to higher proceeds (better returns) since the remaining time-value of the option will also be sold in this case. Exercising early would mean that the time-value would be given up for the exercise price and this would not be ideal. Additionally, since there are no dividends, no cash-flow opportunities will be given up. Take note that if a stock is paying dividends, the early exercise of options may sometimes be optimal since the receipt of the dividends should offset the approximated decline in the stock price, which will not necessarily be compensated in the option's price. The early exercise of in-the-money options may somehow be replicated using European style-options by selling the contract and buying the stock at the market. The proceeds should somehow offset the high price in the market and bring the effective purchase price near the option's strike price.

The study of Yosef and Sarig found that options prices adjust to the newly announced dividend yield. Prices of stocks normally decline whenever dividends are issued since this will be a cash outflow for the firm which would translate to lower assets and retained earnings. Theoretically speaking, the decline in the stock price can be measured approximately by the amount of per share dividends that the company issued. Thus,

$$S_{d'} = S_d - D \tag{5}$$

where:

$S_{d'}$ = price of the stock a day after the dividend issuance
S_d = price of the stock a day before the dividend issuance
D = Dividend in nominal terms

While the decline in the price of the stock is not expected to be realized until the issuance of the dividends, any announcement of new dividends might have an immediate impact on the price of the stock since the market has already priced the stock based on an expected dividend. Thus, if the actual dividend varies from the market's expectation, then said stock might be undervalued or overvalued and the immediate change in the price of the underlying is based on the difference from the expected dividend and the actual dividend. Since we assume that the expected dividend in the next payment period is the last period's dividend payment, then

$$S_{t+1} = S_{t-1} - \left(D_{t+1} - D_{t-1}\right) \tag{6}$$

where:

S_{t+1} = price of the stock a day after the dividend announcement
S_{t-1} = price of the stock a day before the dividend announcement
D_{t-1} = Expected dividend a day before the announcement
D_{t+1} = Expected dividend a day after the announcement

The previously discussed measures on the decline in stock price is normally ignored by long-term stock investors since the loss in the value of the stock is normally offset by the receipt of the dividends. The options investor on the other hand will not receive any dividend payments but will still suffer any decline in the stock of the underlying asset directly based on the intrinsic value of the option.

Theoretically speaking, since the dividend yield of a stock is a variable in the Merton's extended model to value stock options, then one can take the partial derivative of said model with respect to the dividend yield to measure the change in the price of an overlying option. Formally, this can be written as,

$$P_{t+1} = P_{t-1} + \frac{\partial P}{\partial q} \qquad (7)$$

where:

P_{t+1} = option premium a day after the dividend announcement
P_{t-1} = option premium a day before the dividend announcement
q = dividend yield (D_t/S_t)
$\frac{\partial P}{\partial q}$ = partial derivative of the option pricing model with respect to the dividend yield

This relationship will be tested in the study to find out if the partial derivative of Merton's extended model with respect to the dividend yield significantly influences the change in the premium of the option.

METHODOLOGY

The first step in performing this study is to collect all historical data that is necessary which starts by selecting which stocks or firms should be included in the study. The selection process will initially come from the list of the most actively traded options according to the

Bloomberg page on options and the website of the CBOE. From this list, exchange traded funds will be crossed out so that only stocks of firms will remain. The final list that will be created will actually be a basket of firms from various industries, nature of business, firm size, etc. Since the Black-Scholes pricing model was derived to encompass all types of financial assets such as futures, foreign exchange, commodities and equities (not to mention stocks from different industries), then the derived model should also be applicable for any type of stocks.

Daily LIBOR rates for tenors up to one year will be taken which should proxy the risk-free rate in the Black-Scholes Model. The remaining historical market data of the underlying stocks will be collected, specifically the historical closing prices of the stocks, the historical dividends and the date of the dividend announcements.

The dates of the dividend announcement where the dividends changed will be noted and options data will be collected a day before and a day after the noted date. Options prices will then be gathered on different exercise prices and three sub samples of options prices will be created. These are 1) in-the-money options (ITM), 2) at-the-money options (ATM) and 3) out-of the-money options (OTM). If more than one option exists for the same strike price during the noted dates, then the option with a farther expiration date will be the one selected for the study. The reason for this is because *Theta* is greater for an option as the expiration of the contract approaches maturity. Hence if options are closer to maturity were preferred, then despite the change in the dividend yield of the underlying stock, the change in the closing prices of the option for two business days will more likely be influenced by the time-decay factor of the option rather than the dividend change.

Based on the collected option prices, along with the other gathered data in the market, the implied volatility for each option will be computed using Merton's extended model on stock options.

Ordinary Least Squares (OLS) regressions are common statistical tools in measuring the degree of linear relationship of a dependent variable to an independent variable. It involves a method of approximating a linear equation that would go in between the given points so that the sum of squared errors from the predicted points to the true value in the plot are minimized. The coefficient estimates or the slopes of the line are normally interpreted as degree of relationship between the dependent variable and the independent variable. These estimates are normally calculated by common statistical softwares. The same methodology may be applied in testing the linear relationship of two or more independent variables versus one variable.

Test of Significance for the change in dividend yield

The first difference of the dividend yield (q) and option premium (P) will be taken to derive the changes of said variables. The two differences then will be regressed using the change in the option's price (ΔP) as the dependent variable and the change in the dividend yield as the independent variable (Δq). Hence, the OLS estimate

$$\Delta P = \beta_0 + \beta_1 \Delta q + \varepsilon \quad (8)$$

where:

ΔP = change in the option's premium ($P_{t+1} - P_{t-1}$)
P_{t-1} = option's premium a day prior to the dividend announcement
P_{t+1} = option's premium a day after the dividend announcement
Δq = change in the dividend yield of the underlying ($q_{t+1} - q_{t-1}$)
q_{t-1} = dividend yield of the underlying a day before the announcement
q_{t+1} = dividend yield of the underlying a day after the announcement
β_i = Coefficient estimates of the regression simulation
ε = The error term of the regression

For the said regression however, the estimate of the coefficients will not be important. Only the test for the significance of the variable Δq will be checked to see if the change in dividend yield has a significant impact on the change in the option's premium. This will be done separately for calls and puts since they are likely to have different effects in terms of direction.

Derivation of the model

The formula that will measure the change in the option's price for every change in the dividend yield of the underlying stock will be derived from the Merton's extended model. Similar to how the other Greeks came about, the partial derivative of Merton's extended model with respect to the dividend variable $\left(\frac{\partial P}{\partial q}\right)$ will be taken (P is the option price in equation 3). This will be done for the formula of a call option and a put option. The derived function will be used as a model to predict the movement in the option's premium whenever the dividend yield should change.

Back Testing the Derived Model

The derived model will result possibly as a function of the risk-free rate, the price of the underlying stock, the option's time to expiration, which were all collected, and the volatility of the underlying which will be computed. Since all of the said variables are readily available, these information will be used to predict the possible change in the price of the stock option $\left(\frac{\partial P}{\partial q}\right)$ following the change in the underlying stock's dividend yield. Thus, the option's price a

day after the announcement (P_{t+1}) of the new dividend yield will be compared to the estimated new price of the option by adding the original option premium prior to the declaration of the new dividends (P_{t-1}) plus the estimated change for the said premium $\left(\frac{\partial P}{\partial q}\right)$. Formally, the regression model is

$$P_{t+1} = \beta_0 + \beta_1 P_{t-1} + \beta_1 \frac{\partial P}{\partial q} + \varepsilon \tag{9}$$

where:

P_{t-1} = option's premium a day prior to the dividend announcement
P_{t+1} = option's premium a day after the dividend announcement
$\frac{\partial P}{\partial q}$ = the partial derivative of Merton's extended model with respect to dividend yield

Comparing the Estimates of the Partial Derivative of Merton's Extended Model Versus the Prediction Using the Delta of the Option

In theory, the price of a stock will adjust with respect to a change in the dividend issuance,

$$S_{t+1} = S_{t-1} - \left(D_{t+1} - D_{t-1}\right) \tag{10}$$

where:

S_{t+1} = price of the stock a day after the dividend announcement
S_{t-1} = price of the stock a day before the dividend announcement
D_{t-1} = Expected dividend a day before the announcement
D_{t+1} = Expected dividend a day after the announcement

The factor $-(D_{t+1} - D_{t-1})$ therefore is the change in the price of the stock. Thus, given the delta of an option (δ), then we can predict the new price of the option,

$$P_{t+1} = P_{t-1} - \delta\left(D_{t+1} - D_{t-1}\right) \tag{11}$$

where:

P_{t+1} = option premium a day after the dividend announcement

P_{t-1} = option premium a day before the dividend announcement
D_{t-1} = Expected dividend a day before the announcement
D_{t+1} = Expected dividend a day after the announcement

This will be compared to the derived model

$$P_{t+1} = P_{t-1} + \frac{\partial P}{\partial q} \tag{12}$$

where:

P_{t+1} = option premium a day after the dividend announcement
P_{t-1} = option premium a day before the dividend announcement
q = dividend yield (D_t/S_t)
$\frac{\partial P}{\partial q}$ = partial derivative of the option pricing model with respect to the dividend yield

Equating the two, we now have

$$P_{t-1} - \delta(D_{t+1} - D_{t-1}) = P_{t-1} + \frac{\partial P}{\partial q} \tag{13}$$

$$-\delta(D_{t+1} - D_{t-1}) = \frac{\partial P}{\partial q} \tag{14}$$

$$-\frac{\partial P}{\partial q} - \delta(D_{t+1} - D_{t-1}) = 0 \tag{15}$$

The two models (equations 11 and 12) will be compared to see which method yields less errors from the actual numbers in the financial markets.

RESULTS AND DISCUSSION

The Sample

The list of most actively traded options was taken from the CBOE website and Bloomberg pages on options. The initial list is summarized in Table 1.

From the list in Table 1, Exchange Traded Funds were eliminated. Additionally, other firms were also taken out of the list: 1) Cisco Systems Inc., Melco Crown Entertainment Ltd.,

Wellpoint Inc. and Cemex SAB de C.V. were non-dividend paying firms, 2) Interpublic Group of Companies discontinued its dividend issuance since 2003, 3) CBS Corporation and ProLogis options were relatively illiquid prior to 2008 and 4) American International Group was also taken out as historical options information cannot be retrieved at the moment. The final list of firms included in the study is summarized in Table 2.

Furthermore, all data in the financial markets from September 2008 to present were also not included due to the spillover effects of the Sub-prime crisis in the U.S. as stocks and options saw relatively high volatilities during said period which would potentially violate our assumption on constant volatility even in the comparison of price data between three trade dates only.

In total, 102 price changes were collected. Out of which, 51 were on call options and 51 were on put options. Furthermore, among the 102 data points, 32 were in-the-money, 36 were at-the-money and 34 were out-of-the-money.

Test of Significance for the change in dividend yield

The impact of the change in the dividend of an underlying stock to the premium of an overlying option through regression of equation 8 was tested. This was done separately for calls and puts since their effect in terms of direction is likely to be different. The result of the said simulation for calls is in Table 3.

The regression result showed that the change in a stock's dividend yield significantly influences the movements of an overlying call option. This result justifies that the relationship on how an option's premium moves for every unit change in an underlying stock's dividend yield is a valid study.

The significance of the change in a stock's dividend yield to the movements of an overlying put option was also tested. The result of this regression is in Table 4.

Similarly, the regression simulation also shows that the change in a stock's dividend yield is also a significant variable in influencing the movements of an overlying put option. Again, this further shows that it is essential to study how a change in dividend yield influences the movements of an overlying option.

Table 1: List of most actively traded options as seen in the CBOE website and Bloomberg pages on options in 10 August 2009.

Option Ticker	Firm	Industry
C	Citibank	Banking/Finance
BAC	Bank of America	Banking/Finance
QQQQ	Power Shares QQQ	Exchange Traded Fund
SPY	Standard and Poor Trust Series 1	Exchange Traded Fund

Table 1: List of most actively traded options as seen in the CBOE website and Bloomberg pages on options in 10 August 2009.		
Option Ticker	**Firm**	**Industry**
MAC	Macerich Company	Real Estate
XLF	Financial Sector SPDR	Exchange Traded Fund
IPG	Interpublic Group of Companies	Advertising and Marketing Services
VLO	Valero Energy	Petroleum Refining
F	Ford Motor Company	Automotive
IWM	iShares Russel 2000 Index Fund	Exchange Traded Fund
GE	General Electric Company	Diversified Technology, Media & Finance
MBI	MBIA Inc.	Insurance
RF	Regions Financial Corporation	Holdings Company (Banks)
CSCO	Cisco Systems Inc.	Technology
JPM	JP Morgan Chase and Co.	Banking/Finance
ETR	Entergy Corporation	Electricity Production
MPEL	Melco Crown Entertainment Ltd.	Casino/Gaming
CBS	CBS Corporation	Multimedia Broadcasting
WLP	Wellpoint Inc.	Health Benefits
CX	Cemex SAB de C. V.	Cement Manufacturing
AIG	American International Group	Holdings Company (Insurance)
WFC	Wells Fargo and Co.	Banking and Finance
PLD	ProLogis	Distribution Facilities and Services

The result of this experiment may be attributed to investors' behavior whenever a change in the issuance of the amount of dividends is announced. To a stock holder, any capital loss resulting from the decline in the price of the stock due to a dividend issuance will be offset by the receipt of the dividends. However, to an options holder, who will not receive any amount with respect to dividends, the decline in the price of the stock due to the issuance of dividends will be directly affected based on the delta of the option. Thus, whenever there are any announcements of any change in dividends, investors are likely to account for the possible decline or increase in the premium, dependent on which type of option the investors has, making dividend change announcements a significant factor in the changes of a stock options' premium

Table 2: Final list of firms included in the study		
Option Ticker	**Firm**	**Industry**
C	Citigroup Inc.	Banking/Finance
BAC	Bank of America	Banking/Finance
VLO	Valero Energy	Petroleum Refining
F	Ford Motor Company	Automotive
GE	General Electric Company	Diversified Technology, Media & Finance
MBI	MBIA Inc.	Insurance
RF	Regions Financial Corporation	Holdings Company (Banks)
JPM	JP Morgan Chase and Co.	Banking/Finance
ETR	Entergy Corporation	Electricity Production
WFC	Wells Fargo and Co.	Banking and Finance

Table 3: Regression on the change in dividend yield (*q*) with respect to call option premiums (*P*)

```
      Source |       SS       df       MS              Number of obs =      51
-------------+------------------------------           F(  1,    49) =    4.82
       Model |   2.3795808     1   2.3795808           Prob > F      =  0.0329
    Residual |   24.179482    49  .493458817           R-squared     =  0.0896
-------------+------------------------------           Adj R-squared =  0.0710
       Total |  26.5590628    50  .531181256           Root MSE      =  .70247
------------------------------------------------------------------------------
           P |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           q |   23.39686   10.65449     2.20   0.033     1.985854    44.80786
       _cons |  -.3434819   .0987436    -3.48   0.001    -.5419146   -.1450491
------------------------------------------------------------------------------
```

Table 4: Regression on the change in dividend yield (*q*) with respect to put option premiums (*P*)

```
      Source |       SS       df       MS              Number of obs =      51
-------------+------------------------------           F(  1,    49) =    4.36
       Model |  .959172912     1  .959172912           Prob > F      =  0.0419
    Residual |  10.7718895    49  .219834479           R-squared     =  0.0818
-------------+------------------------------           Adj R-squared =  0.0630
       Total |  11.7310624    50  .234621248           Root MSE      =  .46887
------------------------------------------------------------------------------
           P |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           q |     13.655   6.537192     2.09   0.042     .5180237    26.79198
       _cons |   .3841244   .0657668     5.84   0.000     .2519612    .5162877
------------------------------------------------------------------------------
```

Derivation of the model

From equation 3, the price formula for a call on a stock option is

$$C(S,q,t) = Se^{-qt}N(d_1) - Xe^{-rt}N(d_2)$$

where

$$d_1 = \frac{\ln\left(\frac{S}{X}\right) + \left(r - q + \frac{1}{2}\sigma^2\right)t}{\sigma\sqrt{t}} \quad \text{and} \quad d_2 = \frac{\ln\left(\frac{S}{X}\right) + \left(r - q - \frac{1}{2}\sigma^2\right)t}{\sigma\sqrt{t}} = d_1 - \sigma\sqrt{t}\,.$$

S = price of the underlying asset
X = the exercise price of the option
σ = the volatility of the underlying asset
t = time remaining until the expiration of the option (in years)
r = the risk free rate for the given t
q = the dividend yield of the underlying stock

Now, the partial derivative of the given formula with respect to the dividend yield q is

$$\frac{\partial C(S,q,t)}{\partial q} = -tSe^{-qt}N(d_1) + Se^{-qt}\frac{\partial N(d_1)}{\partial q} - Xe^{-r^*t}\frac{\partial N(d_2)}{\partial q} \tag{16}$$

$$= -tSe^{-qt}N(d_1) + Se^{-qt}\frac{\partial N(d_1)}{\partial d_1}\frac{\partial d_1}{\partial q} - Xe^{-r^*t}\frac{\partial N(d_2)}{\partial d_2}\frac{\partial d_2}{\partial q} \tag{17}$$

The first two terms resulted from the application of multiplication rule and chain rule. The cumulative standard normal function is defined as

$$N(x) = \int_{-\infty}^{x} \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}x^2}\,dx$$

Therefore, the partial derivative of $N(x)$ with respect its variable x is

$$N'(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}x^2} \tag{18}$$

Substituting d_1 to x in equation 18, we get the partial derivative of $N(d_1)$ with respect to d_1 written as,

$$N'(d_1) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}d_1^2} \tag{19}$$

Now for the partial derivative $N'(d_2)$, since $d_2 = d_1 - \sigma\sqrt{t}$ thus,

$$\begin{aligned} N'(d_2) &= \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}d_2^2} \\ &= \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}(d_1-\sigma\sqrt{t})^2} \end{aligned} \tag{20}$$

Distributing the square and applying the multiplicative property of exponents to equation 20, we have

$$N'(d_2) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}d_1^2} e^{d_1\sigma\sqrt{t}} e^{-\frac{1}{2}\sigma^2 t} \tag{21}$$

We substitute the definition of d_1 from Merton's extended model (equation 4) to the second exponential term of equation 21 so,

$$N'(d_2) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}d_1^2} e^{\ln\left(\frac{S}{x}\right)+\left(r-q+\frac{1}{2}\sigma^2\right)t} e^{-\frac{1}{2}\sigma^2 t} \tag{22}$$

Further application of the multiplicative property of exponents to the second exponential term of equation 22 and taking note that the natural logarithmic function is the inverse of the exponential function, then,

$$N'(d_2) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}d_1^2} \frac{S}{X} e^{rt} e^{-qt} e^{\frac{1}{2}\sigma^2 t} e^{-\frac{1}{2}\sigma^2 t} \tag{23}$$

The last two exponential terms of equation 23 are multiplicative inverses of each other, which can be effectively cancelled out. Hence, we finally have the partial derivative $N'(d_2)$ in equation 24 as,

$$N'(d_2) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}d_1^2} \frac{S}{X} e^{rt} e^{-qt} \tag{24}$$

Now, substituting the result of equation 19 and equation 24 to the original partial derivative of a call option with respect to the dividend yield *q* in equation 17,

$$\begin{aligned} \frac{\partial C(S,q,t)}{\partial q} &= -tSe^{-qt}N(d_1) + Se^{-qt} \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}\sigma^2} \frac{\partial d_1}{\partial q} - Xe^{-rt} \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}\sigma^2} \frac{S}{X} e^{rt} e^{-qt} \frac{\partial d_2}{\partial q} \\ &= -tSe^{-qt}N(d_1) + Se^{-qt} \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}\sigma^2} \frac{\partial d_1}{\partial q} - Se^{-qt} \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}\sigma^2} \frac{\partial d_2}{\partial q} \end{aligned} \tag{25}$$

Recall that $d_2 = d_1 - \sigma\sqrt{t}$ so that,

$$\frac{\partial d_1}{\partial q} = \frac{\partial d_2}{\partial q} \tag{26}$$

Substituting equation 26 to equation 25 we now have,

$$\frac{\partial C(S,q,t)}{\partial q} = -tSe^{-qt}N(d_1) + Se^{-qt} \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}\sigma^2} \frac{\partial d_1}{\partial q} - Se^{-qt} \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}\sigma^2} \frac{\partial d_1}{\partial q}$$

Clearly the last two terms are additive inverses of each other and we finally have the simplified first partial derivative of a call option's premium with respect to the dividend yield *q* in equation 27 as,

$$\frac{\partial C(S,q,t)}{\partial q} = -tSe^{-qt}N(d_1) \tag{27}$$

The negative sign in the derived equation is consistent with the sign of the regression coefficient in table 3 which implies that the premium of a call on a stock option is inversely related with the changes in the dividend yield of the underlying stock. It means that theoretically, an increase in the dividend yield of an underlying stock should translate to a decline in the option price.

Merton's extended model for a dividend paying put on a stock option is,

$$P(S,q,t) = Xe^{-rt}N(-d_2) - Se^{-qt}N(-d_1)$$

using the same variables given in the call option formula. Using the multiplication rule of differential calculus, the partial derivative of this equation with respect to the dividend yield variable q is,

$$\frac{\partial P(S,q,t)}{\partial q} = Xe^{-r^*t}\frac{\partial N(-d_2)}{\partial q} + tSe^{-qt}N(-d_1) - Se^{-qt}\frac{\partial N(-d_1)}{\partial q} \tag{28}$$

By definition of the standard normal distribution, $N(-x) = 1-N(x)$. Thus,

$$\frac{\partial P(S,q,t)}{\partial q} = Xe^{-r^*t}\frac{\partial[1-N(d_2)]}{\partial q} + tSe^{-qt}N(-d_1) - Se^{-qt}\frac{\partial[1-N(d_1)]}{\partial q} \tag{29}$$

Now by applying the chain rule, we have,

$$\frac{\partial P(S,q,t)}{\partial q} = Xe^{-r^*t}\frac{\partial[1-N(d_2)]}{\partial d_2}\frac{\partial d_2}{\partial q} + tSe^{-qt}N(-d_1) - Se^{-qt}\frac{\partial[1-N(d_1)]}{\partial d_1}\frac{\partial d_1}{\partial q} \tag{30}$$

Negating the result of equation 19 and substituting it to equation 30, then,

$$\frac{\partial P(S,q,t)}{\partial q} = Xe^{-r^*t}\frac{\partial[1-N(d_2)]}{\partial d_2}\frac{\partial d_2}{\partial q} + tSe^{-qt}N(-d_1) + Se^{-qt}\frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}d_1^2}\frac{\partial d_1}{\partial q} \tag{31}$$

Similarly, we negate equation 24 and substitute to equation 31 to get,

$$\begin{aligned}\frac{\partial P(S,q,t)}{\partial q} &= -Xe^{-rt}\frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}d_1^2}\frac{S}{X}e^{rt}e^{-qt}\frac{\partial d_2}{\partial q} + tSe^{-qt}N(-d_1) + Se^{-qt}\frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}d_1^2}\frac{\partial d_1}{\partial q} \\ &= -Se^{-qt}\frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}d_1^2}\frac{\partial d_2}{\partial q} + tSe^{-qt}N(-d_1) + Se^{-qt}\frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}d_1^2}\frac{\partial d_1}{\partial q}\end{aligned} \tag{32}$$

We now substitute the result of equation 26 to equation 32 to obtain,

$$\frac{\partial P(S,q,t)}{\partial q} = -Se^{-qt}\frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}d_1^2}\frac{\partial d_1}{\partial q} + tSe^{-qt}N(-d_1) + Se^{-qt}\frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}d_1^2}\frac{\partial d_1}{\partial q}$$

Clearly the first and last terms are additive inverses and the partial derivative of a put on a stock option with respect to the dividend yield q is seen in equation 33 as,

$$\frac{\partial P(S,q,t)}{\partial q} = tSe^{-qt}N(-d_1) \tag{33}$$

Equation 33 resulted as a non-negative term which is consistent with the resulting coefficient of the regression in table 4 which means that the premium of a put on a stock option is directly proportional to the changes in the dividend yield of an underlying stock. That is, an increase in the dividend yield of an underlying stock would theoretically result to higher premiums of the overlying option.

Equations 27 and 33 theoretically describe the change in a stock options' premium for every unit of change in the dividend yield of the underlying stock for a call and a put, respectively. Hence, ideally, the said equations are the *greek* equivalent of a stock option, describing the sensitivity of the premium to dividend yield of an underlying stock. For simplicity, we shall refer to these equations as *dividend-greek* for the rest of the study.

Back Testing the Derived Model

The derived dividend-greek method is then tested if it proves to be a significant estimator of the change in stock options' premium for every unit change in the dividend yield of the underlying stock. To test this, a multiple regression simulation was used, setting the option premiums after the dividend announcement as the dependent variable, while the option premiums before the dividend announcement coupled with the dividend-greek estimates as the independent variables. Again, only the significance of the dividend-greek variable in the regression will be measured while the estimated coefficient will not bear much importance to the study. The outcome of this regression for calls on stock options is detailed in Table 5.

Based on the regression results, the estimates obtained by applying the dividend-greek method proved to be a significant variable in approximating the change in the price of an option, following announcements of dividend changes by the underlying stocks. The negative sign on the estimate proves to be consistent with what was derived in equation 27. That is, an increase in the dividend yield in an underlying stock should effect to a corresponding decrease to the premium of an overlying call option. A call option sample for each firm is detailed in Table 6, including the corresponding dividend-greek estimates.

Table 5:Regression on call option premium after the dividend announcement (PAfter) versus the call option premium before dividend announcement (PBefore) and the dividend-greek estimates for calls on stock options (DGrk).

```
      Source |       SS       df       MS              Number of obs =      51
-------------+------------------------------           F(  2,    48) =  507.65
       Model |  414.863706     2  207.431853            Prob > F      =  0.0000
    Residual |  19.6134962    48  .408614505            R-squared     =  0.9549
-------------+------------------------------           Adj R-squared =  0.9530
       Total |  434.477202    50  8.68954404            Root MSE      =  .63923

------------------------------------------------------------------------------
      PAfter |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     PBefore |   .9277698   .0310205    29.91   0.000     .8653989    .9901407
        DGrk |  -1.639286   .7032771    -2.33   0.024    -3.053319   -.2252525
       _cons |  -.0518321   .1731617    -0.30   0.766     -.399997    .2963327
------------------------------------------------------------------------------
```

Table 6.: Dividend and call options premium data including their changes versus the estimated change using the dividend-greek (Div Grk) method.

Firm	Dates	Dividend			Premium		Div Grk	Diff
		Amount	Yield	Yield chg	Price	Change		
Citigroup	01/17/07 01/22/07	0.49 0.54	3.5875% 3.9309%	0.3434%	3.40 3.36	-0.04	-0.1546	0.1146
Bank of Amrca	07/23/07 07/26/07	0.56 0.64	4.7228% 5.3839%	0.6611%	4.10 3.90	-0.20	-0.2136	0.0136
Valero Energy	01/17/07 01/19/07	0.08 0.12	0.6312% 0.9393%	0.3082%	4.90 4.90	0.00	-0.0392	0.0392
Ford Motors	07/11/06 07/17/06	0.10 0.05	5.8395% 3.1080%	-2.7315%	0.65 0.70	0.05	0.0930	0.0430
General Elctr	12/10/07 12/12/07	0.28 0.31	2.9827% 3.3151%	0.3324%	5.31 5.20	-0.11	-0.0908	0.0192
MBIA Inc.	02/23/06 02/28/06	0.28 0.31	1.8938% 2.1054%	0.2116%	4.00 3.90	-0.10	-0.0323	0.0677
Regions Fin	12/08/06 12/13/06	0.35 0.36	3.7956% 3.8679%	0.0723%	0.30 0.30	0.00	-0.0022	0.0022
JP Morgan	04/17/07 04/19/07	0.34 0.38	2.7011% 2.9074%	0.2063%	3.90 4.58	0.68	-0.0833	0.7633
Entergy Corp	07/27/07 07/31/07	0.54 0.75	2.2016% 3.0372%	0.8356%	4.50 4.00	-0.50	-0.2778	0.2222
Wells Fargo	07/23/07 07/25/07	0.28 0.31	3.2009% 3.6380%	0.4371%	0.40 0.35	-0.05	-0.0433	0.0067

The column "*Diff*" shows the absolute difference of the actual premium change versus the change estimates using the dividend-greek method. Except for the difference of JP Morgan, the table reveals that the dividend-greek estimates do not vary much as against the actual changes in the premium.

T he result of the same regression for put options can be seen in Table 7. Similarly, the regression result for the dividend-greek estimates reveals to be significant. This means that the dividend-greek estimation is a valid model in anticipating put option prices, whenever the dividend yield of the underlying stock should change. The sign of the coefficient is also consistent with our derived model in equation 33. Hence, an increase in the dividend yield should translate to an increase in the premium of an overlying put option. A put option sample for each firm is detailed in Table 8, which includes the corresponding dividend-greek estimates for each.

Table 7: Regression on put option premium after the dividend announcement (PAfter) versus the put option premium before dividend announcement (PBefore) and the dividend-greek estimates for puts on stock options.

```
      Source |       SS       df       MS              Number of obs =      51
-------------+------------------------------           F(  2,    48) =  910.00
       Model |  369.310024     2  184.655012           Prob > F      =  0.0000
    Residual |  9.74006276    48  .202917974           R-squared     =  0.9743
-------------+------------------------------           Adj R-squared =  0.9732
       Total |  379.050087    50  7.58100173           Root MSE      =  .45046

------------------------------------------------------------------------------
      PAfter |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     PBefore |   1.047547     .02494    42.00   0.000     .9974016    1.097692
       DGrk |   .9098787   .4077672     2.23   0.030     .0900078     1.72975
       _cons |   .1659106   .1171748     1.42   0.163    -.0696851    .4015063
```

Table 8: Dividend and put options premium data including their changes versus the estimated change using the dividend-greek (Div Grk) method.

Firm	Dates	Dividend			Premium		Div Grk	Diff
		Amount	Yield	Yield chg	Price	Change		
Citigroup	01/18/07 01/26/07	0.49 0.54	3.5803% 3.9853%	0.4050%	1.70 1.80	0.10	0.0977	0.0022
Bank of Amrca	07/25/06 07/27/06	0.50 0.56	3.9032% 4.3665%	0.4633%	0.50 0.60	0.10	0.0503	0.0497
Valero Energy	10/24/07 10/30/07	0.12 0.15	0.6651% 0.8373%	0.1722%	11.10 11.20	0.10	0.0730	0.0270

Table 8: Dividend and put options premium data including their changes versus the estimated change using the dividend-greek (Div Grk) method.

Firm	Dates	Dividend			Premium		Div Grk	Diff
Ford Motors	07/11/06 07/14/06	0.10 0.05	5.8395% 3.1226%	-2.7169%	0.90 0.95	0.05	-0.0813	0.1313
General Elctr	12/10/07 12/12/07	0.28 0.31	2.9827% 3.3347%	0.3520%	0.57 0.64	0.07	0.0568	0.0132
MBIA Inc.	02/23/07 03/01/07	0.31 0.34	1.8191% 2.0353%	0.2162%	1.90 2.00	0.10	0.0157	0.0843
Regions Fin	12/07/06 12/12/06	0.35 0.36	3.7966% 3.9025%	0.1058%	3.70 3.70	0.00	0.0090	0.0090
JP Morgan	04/17/07 04/24/07	0.34 0.38	2.2016% 3.0372%	0.3002%	2.10 2.15	0.05	0.1123	0.0623
Entergy Corp	07/27/07 07/31/07	0.54 0.75	2.2016% 3.0372%	0.8356%	3.10 3.10	0.00	0.0591	0.0591
Wells Fargo	07/23/07 07/25/07	0.28 0.31	3.2009% 3.6380%	0.4371%	3.41 3.90	0.49	0.1056	0.3844

The column "*Diff*" shows the distance of the actual premium change versus the change estimates using the dividend-greek method. In this subgroup, only the estimates on Wells Fargo seemed to have a large distance with the actual change in premium while the rest showed relatively small errors from the actual change.

Next step now is to compare how the derived model performs versus the approximation using the option's delta and this will be discussed in the next subchapter.

Comparing the Estimates of the Derived Model Versus the Prediction Using the Delta of the Option

Whenever the amount of dividend issued by a stock changes, a corresponding adjustment in the stock price may be estimated based in the difference of the new dividend and the expected amount. This difference will be referred to as $(D_{t+1} - D_{t-1})$ where D_{t+1} denotes the expected dividends prior to announcement while D_{t-1} denotes the expected dividend after the announcement. By measuring this expected change on the stock price and multiplying it with an overlying option's delta, $\delta(D_{t+1} - D_{t-1})$, then the change in a stock option's premium may be approximated. For simplicity, we shall refer to this method as the *stock-dividend-delta*. This method of estimating the change in a stock option's premium will be compared to the proposed model of utilizing a stock option's greek based on the dividend yield, $\left(\frac{\partial P}{\partial q}\right)$. For call options, the estimates are seen in table 9 while table 10 shows the results for put options.

In both tests, it was found that using any of the two techniques will derive almost the same estimate. The approximations produced by the dividend-greek method however, seem to produce slightly better estimates.

Table 9: Dividend and call options premium data including their changes and the estimated change using the dividend-greek method (Div Grk) and the stock-dividend-delta approach (SDdlta).

Firm	Dates	Dividend		Premium		Div Grk	SDdlta
		Yield	Yield chg	Price	Chnge		
Citigroup	01/14/08 01/16/08	7.3647% 4.7233%	-2.6414%	2.43 1.28	-1.15	0.1585	0.1028
Bank of Amrca	07/23/07 07/26/07	4.7228% 5.3839%	0.6611%	4.10 3.90	-0.20	-0.2136	-0.0363
Valero Energy	01/17/07 01/19/07	0.6312% 0.9393%	0.3082%	10.70 10.50	-0.20	-0.1184	-0.0298
Ford Motors	07/11/06 07/17/06	5.8395% 3.0936%	-2.7459%	2.55 2.60	0.05	0.0930	0.0162
General Elctr	12/10/07 12/12/07	2.9827% 3.3151%	0.3324%	5.31 5.20	-0.11	-0.0908	-0.0195
MBIA Inc.	02/23/06 02/28/06	1.8938% 2.1054%	0.2116%	7.30 7.00	-0.30	-0.0426	-0.0208
Regions Fin	10/15/07 10/18/07	4.9131% 5.6027%	0.6897%	5.30 3.60	-1.70	-0.0884	-0.0147
JP Morgan	04/17/07 04/19/07	2.7011% 2.9074%	0.2063%	3.90 4.58	0.68	-0.8332	-0.0181
Entergy Corp	07/27/07 07/31/07	2.2016% 3.0372%	0.8356%	4.50 4.00	-0.50	-0.2778	-0.1075
Wells Fargo	07/23/07 07/25/07	3.2009% 3.6380%	0.4371%	0.40 0.35	-0.05	-0.0433	-0.0056
Averages					-0.35	-0.1457	-0.0133

Theoretically, this outcome was highly likely since the dividend-greek approximation is a direct estimation tool based on Merton's extended model while the stock-dividend-delta approach is indirect as it needs to estimate the change in the stock price first before projecting the change with respect to delta. Thus, any approximation errors acquired on the first estimation method will be compounded to the errors of the second estimation technique.

Table 10: Dividend and put options premium data including their changes and the estimated change using the dividend-greek method (Div Grk) and the stock-dividend-delta approach (SDdlta)*

Firm	Dates	Dividend		Premium		Div Grk	SDdlta
		Yield	Yield chg	Price	Chnge		
Citigroup	01/18/07 01/26/07	3.5803% 3.9853%	0.4050%	1.70 1.80	0.10	0.0977	0.0142
Bank of Amrca	07/25/06 07/27/06	3.9032% 4.3665%	0.4633%	0.50 0.60	0.10	0.0503	0.0094
Valero Energy	10/24/07 10/30/07	0.6651% 0.8373%	0.1722%	11.10 11.20	0.10	0.0730	0.0124
Ford Motors	07/11/06 07/14/06	5.8395% 3.1226%	-2.7169%	0.90 0.95	0.05	-0.0813	-0.0142
General Elctr	12/10/07 12/12/07	2.9827% 3.3347%	0.3133%	0.57 0.64	0.07	0.0568	0.0046
MBIA Inc.	02/24/06 03/02/06	1.8720% 2.1231%	0.2511%	1.20 1.50	0.30	0.0324	0.0070
Regions Fin	10/15/07 10/26/07	4.9131% 5.5863%	0.6732%	2.90 3.80	0.90	0.0564	0.0105
JP Morgan	04/17/07 04/24/07	2.6034% 2.9035%	0.3002%	3.40 3.62	0.22	0.1238	0.0144
Entergy Corp	07/23/07 07/31/07	2.2016% 3.0372%	0.8356%	5.10 5.90	0.80	0.0621	0.1139
Wells Fargo	07/20/07 07/26/07	3.2129% 3.6681%	0.4453%	1.70 2.45	0.75	0.0926	0.0081
Averages					0.34	0.0564	0.0180

CONCLUSION

This study has found that for a dividend-paying stock option, if a change in dividends is announced, then the difference of the previously issued dividends and the newly announced dividends is a significant indicator with regard to the immediate movements in the premium of the stock option. The significance of the said change in dividends was measured through a simple linear regression model and the change in the dividend yield variable proved to be significant. This was an expected outcome as options holder will have to account for a possible decline in the underlying stock's price due to dividend issuance, effectively decreasing or increasing the option premium depending on whether it is a call or a put, respectively.

The study also found the theoretical change in a stock option's premium for every change in the underlying stock's dividend yield by taking the first partial derivative of Merton's extended model for dividend-paying stock options to price a call or a put. Ideally, these differentials are the effective equivalent of a stock option's greek sensitivity to the dividend yield variable q. These *dividend-greeks* are $\frac{\partial C(S,q,t)}{\partial q} = -tSe^{-qt}N(d_1)$ and $\frac{\partial P(S,q,t)}{\partial q} = tSe^{-qt}N(-d_1)$ for a call and a put stock option, respectively. The negative sign on the said greek for a call option means that the premium and the dividend yield of the underlying stock is inversely related. That is, an increase in the dividend yield of an underlying stock should translate to a decline in the premium of an overlying call option. For a put option on the other hand, the derived term is non-negative which means that the dividend yield of the underlying stock is directly proportional to the put option premium. This implies that if the dividend yield of an underlying stock should increase, a corresponding increase in the price of an overlying put option may also be expected.

The derived dividend-greek was tested to find if it is a significant component in approximating the new price of a stock option whenever a change in the amount of dividend is announced. A simple regression model was done to test this and it was found that the dividend-greek model is a significant component in modeling the price of an option. This means that whenever the underlying stock of an option announced a change in dividend payments, then the new price of the overlying option may be approximated by taking the existing option's price and adding the corresponding dividend-greek component.

Options' premium following the announcement of new dividends may also be approximated by estimating the expected change in the underlying stock's price due to the change in dividend yields and then multiplying this to the existing delta of an option. And this method of projecting the new option premium for a change in dividend was compared to the derived approximation model using the dividend-greek method. The average of the estimates were measured and compared to the actual changes in the option prices. It was found that the estimates using the dividend-greek method had relatively smaller errors than the delta approach, and also had smaller standard deviations. Thus it can be concluded that the approximation using the dividend-greek method is slightly more accurate than the delta-aproach of approximating the new price of an option. This was an expected outcome since the dividend-greek method is a more direct approximation from Merton's extended model to price options. The delta-approach on the other hand is an indirect method as it needs two estimates: 1) approximations on the possible change in the underlying stock and 2) delta approximation based on the projected change in the underlying.

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ORGANIZATIONAL AND INDIVIDUAL DETERMINANTS OF CAREER SUCCESS OF MBA STUDENTS

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ABSTRACT

This paper identified the factors that affect objective and subjective measures of career success. Objective measures included total compensation and rank level from the company president. Subjective measure was career satisfaction. The sample consisted of students in the MBA program of the University of the Philippines.

Both organizational and individual factors influence career success. However, the different measures of career success have different determinants, and these three measures of career success are not correlated.

One consistent finding in studies on career success using Philippine sample is that gender did not explain variation in total compensation, number of levels from company president, and career satisfaction. These null results have several implications. First, there exist income and status parity between female and male MBA students. Second, it challenges the generalizability of findings on gender differential in income, status, and career satisfaction common in studies based on samples from the United States and Europe.

Keywords: determinants of career success, objective career success, subjective career success

INTRODUCTION

A career is a sequence of jobs an individual holds during one's work history (Feldman, 1996). While success in one's career is a natural expectation of individuals, the nature of that success depends on what one expects from it. Indeed individuals have different definitions of career success based on their assessment of their career prospects (Ebadan & Winstanley, 1997). Career success includes both the psychological and work-related outcomes from work role changes (London & Stumpf, 1982). Thus career success has been operationalized by objective and subjective measures.

Objective measures of career success pertain to those that can be observed and verified by others (Judge et al., 1995). Several researchers have studied career success using objective measures such as total compensation (Pfeffer & Davis-Blake, 1987; Seibert, Kraimer & Liden, 2001; Whitely, Dougherty & Dreher, 1991; Whitely & Coetsier, 1993; Kirchmeyer, 1998),

number of promotions (Wayne et al., 1999; Whitely, Dougherty & Dreher, 1991; Whitely & Coetsier, 1993), current pay grade (Daley, 1996), and size of most recent merit increase (Lobel & St. Clair, 1992).

Subjective measures of career success (Judge et al., 1995) pertain to the individuals' own judgment of their career attainment. Studies on subjective career success used measures such as career satisfaction (Martins, Eddleston & Veiga, 2002; Seibert, Kraimer & Liden, 2001; Poole, Langan-Fox & Omodei, 1993), job satisfaction (Judge et al., 1995; Burke, 2001), advancement satisfaction (Martins, Eddleston & Veiga, 2002), and perceived career success (Turban & Dougherty, 1994), among others.

While objective measures of success are important, they may not be the only measures an individual wants to achieve. Inasmuch as individuals define career success based on their assessment of career prospects (Ebadan & Winstanley, 1997), individuals expect a lot more from their careers other than compensation, promotion, and other objective measures. Individuals also expect to learn new skills, challenge, and work life balance, among others (Gattiker & Larwood, 1988; Heslin, 2005). Several authors have also pointed out that when relationship between objective and subjective career success is found (Judge & Bretz, 1994), it is influenced by different factors (Ng et al., 2005)—e.g., relationship may be found in males but not in females (Mayrhofer et al., 2008)—or that objective and subjective career success may not be related at all (Hall, 2002; Breland et al., 2007).

Studies on career success in the Philippines have evolved from using managers' attribution of career success (Supangco, 1985; Supangco 1988; Hoffart, 1990) to statistically identifying the factors of career success (Supangco, 2001; Supangco 2010). Supangco (2001), looked at the influences of human capital and demographic factors on objective career success while Supangco (2010) looked at the separate influences of human capital and stable personality characteristics on the one hand, and of organizational sponsorship of the other, on both objective and subjective career success.

This study further explores the dynamics of career success in the Philippine setting by specifically looking at the influences of both organizational and individual characteristics on subjective and objective measures of career success among MBA students of the University of the Philippines. Results of analyses will be explained using various theoretical perspectives.

Research on career success is very important to both the individual and organization. For individuals spending about a third of their time at work, career success is a logical expectation. On the other hand, to organizations, employees' attainment of career success implies that employees have achieved organizational goals and thus may be leveraged for sustained competitive advantage.

The choice of MBA students stems from the consideration that mere enrollment in the MBA program signals the students' seriousness in empowering themselves to take a proactive role in their career development. Some of these students are part-time students, which actually speaks of their superior ability to balance the demands of work, the MBA program, and other

aspects of their lives. Given these considerations, a lot can be learned from studying this group of individuals.

To achieve career success, both the individual and the organization invest time, effort, and resources on career development activities. Ideally, career development is a joint responsibility of the individual and the organization. However, business activities such as downsizing, reengineering, and restructuring, which result in fewer workers and lesser opportunities for them in the organizations, render career development more challenging. Such diminished growth and opportunities present challenges as well for the individual to take a more proactive role in his career development (Heslin, 2005; Feldman, 1996).

FACTORS INFLUENCING CAREER SUCCESS

Studies have identified several factors influencing objective career success, which can be categorized into human capital, demographic, interpersonal processes, and organizational (Whitely, Dougherty & Dreher, 1991; Whitely & Coetsier, 1993).

Human capital factors include experience, education, continuous work history, and tenure. Becker (1975) argued that investments in human capital result in higher wages due to increases in productivity. Such productivity increases may be the result of training, learning new skills, or enhancing existing skills. Empirical studies along this line show that human capital factors indeed influence different measures of career success. For example, education is positively related to current pay grades (Daley, 1996). Moreover, factors such as having an MBA, longer work experience, and a continuous work history positively influence compensation (Whitely, Dougherty & Dreher, 1991; Whitely & Coetsier, 1993; Forret & Dougherty, 2004). Work experience (Whitely, Dougherty & Dreher, 1991; Whitely & Coetsier, 1993) and continuous history also positively influence promotion rate (Whitely, Dougherty & Dreher, 1991; Forret & Dougherty, 2004).

Demographic factors commonly studied include gender and marital status. There are evidences that show gender differences in compensation and other work-related outcomes in organizations, for example, male employees receive higher compensation (Whitely, Dougherty & Dreher, 1991; Whitely & Coetsier, 1993; Daley, 1996; Lobel & St. Clair, 1992). However, differences in merit increases between genders ceased to be significant when other considerations, such as career identity salience and family responsibility, were controlled (Lobel & St. Clair, 1992). Moreover, in a study using longitudinal research design, Shenav (1992) found that white women's opportunities were better compared to those of white men in the private sector. However, a different scenario emerges when a cross-sectional design was used on the same data set.

Shenav (1992) shows that women and blacks had lower chances of promotion to managerial positions compared to male and white samples. The finding was more congruent with results supporting gender segregation. However, Pfeffer and Davis-Blake (1987) found that the

proportion of women in the organization is negatively associated with compensation of both men and women in both cross-sectional and longitudinal research design. Another demographic variable commonly studied in relation to career success is marital status. Several studies show that married employees have higher salaries and number of promotions than non-married employees (Ng et al., 2005; Judge et al., 1995; Judge & Bretz, 1994; Pfeffer & Ross, 1982).

Organizational factors like organization size also affect career outcomes. Whitely and Coetsier (1993) reported that organization size positively relates to number of promotions. It is thought that larger organizations have greater ability to pay and offer more promotion opportunities (Whitely & Coetsier, 1993).

In addition, interpersonal process like mentoring has also been found to affect career success. Mentoring includes coaching, support, and sponsorship, which provide the protégés the technical and interpersonal skills, and visibility opportunities that enable them to succeed in their careers (Whitely, Dougherty & Dreher, 1991). Having a mentor positively influences compensation (Whitely, Dougherty & Dreher, 1991; Whitely & Coetsier, 1993); promotability (Wayne et al., 1999), and salary grades (Daley, 1996). However, the gender of the mentor affects career outcomes. Female mentors negatively influence the protégé's career success (Daley, 1996), but male mentors positively influence compensation of protégés, especially for women protégées in male-gendered industries (Ramaswami et al., 2010).

The above studies show factors affecting objective measures of success such as compensation, pay grades, number of promotions, and promotion rates. While objective measures are important in assessing how far an individual's career has progressed, subjective measures are equally important, considering that individuals have expectations from work other than compensation, promotion, etc. Inasmuch as prospects of long-term employment are dim such that individuals are expected to be more proactive in managing their careers, career measures of success become more personal and subjective (Van Dam, 2008).

There seems to be no consistent result showing which variables influence subjective career success. Judge et al. (2005) found that different set of variables predicted the two measures of subjective career success, namely, career satisfaction and job satisfaction. Demographic and human capital variables significantly explained career satisfaction but not job satisfaction. Motivational and organizational variables explained job satisfaction. However, organizational success influences both job and career satisfaction. On the other hand, Aryee, Chay and Tan (1994) found no human capital variable explaining subjective career success.

Specific individual factors found to predict subjective career success include tenure, education, and marital status. Clark and Oswalt (1996) found a positive relationship between education and job satisfaction, but such relationship vanished when controlled for income levels. However, tenure is inversely related to career satisfaction (Judge et al., 1995). On the other hand, married employees in general (Ng et al., 2005) and married women in particular (Punnet, 2005) are more satisfied than those who are not.

On the other hand, organizational factors affecting subjective career success include perceived organizational support in the form of mentoring, supervisory support, developmental assignments, and role conflict and ambiguity. Mentoring was found to be positively related to subjective career success (Joiner, Bartram & Garreffa, 2004; Eby, Butts & Lockwood, 2003; Fagenson, 1989). Perceived supervisory support (Tanksi & Cohen, 2001; Kirchmeyer 1998) influences career satisfaction. Training received by individuals also influences career satisfaction (Ng et al., 2005; Wayne et al., 1999). In addition, role conflict (Bedeian & Armenakis, 1981) and role ambiguity (Igbaria & Guimaraes, 1999) are negatively related to job satisfaction.

Studies on career success in the Philippines show that different measures of career success have different determinants. Cash compensation is determined positively by work experience (Supangco, 2001), tenure in organization, and education (Supangco, 2010), and negatively by supervisory support (Supangco, 2010). Number of years per promotion is negatively determined by number of organizations worked for while number of promotions was determined negatively by number of organizations worked for and positively by work experience (Supangco, 2001). On the other hand, rate of promotion was positively determined by work experience (2010). Moreover, number of rank levels from the company president was determined positively by organization size, and women were farther from the top. Determinants of career satisfaction included supervisory support, perceived organizational support, and developmental experience. In these two studies, gender objective and subjective measures of success were invariant to gender, except for hierarchical success, measured in terms of number of rank levels from the company president where women were still far from the top. The general results on gender augur well for women in the Philippines and also make the phenomenon unique and in contrast to most studies conducted in the United States and Europe that indicate gender differences, especially in objective career success.

METHODOLOGY

The following sections describe the methodology used in this study. This includes sampling, data processing, and measurement of variables.

Sampling

Data were collected in July-August 2010 using a structured questionnaire. The sample students were chosen using systematic sampling with a random start. A total of 190 questionnaires were sent to selected students who were enrolled in the MBA program of the University of the Philippines during the first trimester of academic year 2010-2011; 76 students sent back their accomplished questionnaires, or a response rate of 39.8%.

Data processing

In order to determine the patterns of career success, the author analyzed data using frequency distributions, means, and mode. To arrive at the factors affecting career success, a series of step-wise regression analyses were conducted. For all the measures of career success, non-perceptual measures, except those represented by dummy variables, were entered first. Once significant variables were determined, perceptual measures were entered. Again once a model is arrived at, categorical variables were added using multiple regression. Non-significant variables were removed to arrive at the final models. Only the final models for all the three measures of career success are presented in this paper.

This study utilized multiple items in measuring a concept, derived from different studies, thus the need to empirically examine their dimensionality (Snell, 1992). Items under each concept were summarized using factor analysis with varimax rotation.

Measures

The following describes how variables in this study are measured. Perceptual and non-perceptual measures were utilized.

Dependent Variable

Objective measures of career success include total cash compensation and number of levels from the company president.

The subjective measure of career success was a career satisfaction scale developed by Greenhaus, Parasuraman, and Wormley (1990), which assessed the degree to which the individual has progressed toward income, advancement, and skill development goals as well as general satisfaction with career progress. Reported coefficient alpha values range from .83 to .89 (Fields, 2002). Coefficient alpha in this study is .89

Independent Variables

Independent variables used in this study include both perceptual and non-perceptual measures. Perceptual measures include the following:

Supervisory support

Supervisory support was measured using a scale developed by Greenhaus, Parasuraman, and Wormley (1990), which assesses employees' perceived support that they get from their

supervisors in doing their jobs (Fields 2002). Reported coefficient alpha was .90 (Fields, 2002). Coefficient alpha in this study is .92.

Developmental experience

Developmental experience was measured with a scale developed by Wayne, Shore, and Liden (1977), which assesses the extent to which organizations invest in formal and informal training and development for employees. Reported coefficient alpha was .87 (Fields 2002). Coefficient alpha in this study is .90.

Perceived organizational support

Perceived organizational support is measured by a scale developed by Eisenberger (1986) that assesses employees' perceptions of the degree to which their organizations value their contributions and well-being. Reported coefficient alpha values ranged from .74 to .95 (Fields 2002). Coefficient alpha in this study is .91.

Role conflict

Role conflict is measured by a scale developed by House, Schuler, and Lavanoni (1983). Reported coefficient alpha values ranged from .79 to .86 (Fields, 2010). Coefficient alpha in this study is .83.

Role ambiguity

Role ambiguity is measured by a scale developed by Rizzo, House, and Lirtzman (1970). The scale measured the degree to which employees experienced absence of predictability, clarity, and certainty in their roles. Coefficient alpha values ranged from .71 to .95 (Fields 2002). Coefficient alpha in this study is .86. Due to the reverse wording of the statements, the term used in this study is role clarity.

Procedural justice

Procedural justice is measured by a scale developed by Parker, Baltes, and Christiansen (1977). It measures voice and choice dimensions of procedural justice by assessing employees' perception of the extent to which they provide inputs and are involved in decision making. Reported coefficient alpha value was .74 (Fields 2002). Coefficient alpha in this study is .80

Distributive justice

Distributive justice is measured using a scale developed by Nichoff ad Moorman (1993). This scale measures the extent to which employees perceive their work outcomes—such as pay level, work schedule, workload, and job responsibilities—as fair. Reported coefficient alpha values ranged from .72 to .74 (Fields, 2002). Coefficient alpha in this study is .84

On the other hand, independent variables using non-perceptual measures include the following:

Average number of employees in the organization in 2009
Average number of employees in department in 2009
Years of work experience
Tenure in position
Tenure in organization
Number of organizations worked for
Mentoring, designated with 1 when the individual has a mentor and 0 otherwise
Gender, where female was assigned a value of 1 and 0 otherwise
Marital status, where single was assigned a value of 1 and 0 otherwise

RESULTS

Table 1 presents means and standard deviations of variables included in the models of career success. Respondents' average annual compensation was Php 589,898.55, and they were 5.4 levels away from the company president. They have worked an average of 6.8 years in about 2.5 organizations. They have been in their current organization for about 3.77 years and in their position for some 2.14 years. They worked in their first organizations for about 33.9 months (2.8 years). A little over three quarters (76.3%) reported having a mentor. Half of the respondents were females and about 81.6 % are single.

Table 2 presents bivariate correlations of variables included in the final models of career success. The three measures of career success—compensation, rank levels from the president, and career satisfaction—are not correlated at the p<. 01 and p<. 05 levels. However, compensation and levels from company president are correlated at p<. 10. Among the explanatory variables, tenure variables are related to total work experience, while role clarity is related to the other two perceptual measures: procedural justice and developmental experience. However, size variables (employees in organization and employees in department) are not related.

Table 3 shows the standardized coefficients of variables that determine the three measures of career success.

Table 1 : Means and Standard Deviations of Variables			
Variables	Mean/Mode	Standard Deviation	Number Of Observations
Annual Compensation	P589, 898.55	P351, 695.52	69
No. of Rank Levels from Company President	5.4394	2.8073	66
Work Experience (Years)	6.81	4.71	76
Number of Organizations Worked For	2.53	1.38	74
Tenure in Organization (Years)	3.77	2.54	76
Tenure in Position (Years)	2.14	1.80	76
Tenure in First Organization (Months)	33.8750	33.4317	76
Mentoring Experience	Had Mentor: 76.3%		76
Gender	Male and Female: 50%		76
Civil Status	Single: 81.6 %		76

Table 2: Correlation Matrix of Selected Variables											
	1	2	3	4	5	6	7	8	9	10	11
1. Compensation	1	-.218^{+}	.178	.533**	.202	-.047	.304*	.128	.242*	.163	.114
2. Rank Levels from President		1	.055	-.196	-.007	.369**	.079	.194	.126	-.040	-.073
3. Career Satisfaction			1	.034	.069	-.087	.325**	.463**	.461**	.210+	-.226**
4. Work Experience				1	-.025	.017	.082		.140	.308**	.352*
5. Employees in Department					1	.062	.146	.054	.112	-.006	-.036
6. Employees in Organization						1	.006	.002	-.013	-.014	-.012
7. Procedural Justice							1	-.073	.385**	.148	-.116
8. Developmental Experience								1	.288*	.112	-.180
9. Role Clarity									1	.078	.063
10. Tenure in First Organization										1	.308**
11. Tenure in Position											1
$^{+}$p< .10; *p<. 05; **p<. 01											

Model 1 explains 56.7 percent of the variation in compensation. The model shows two individual factors—work experience (a human capital variable) and civil status (a demographic variable)—explaining differences in compensation. In addition, organizational variables, such as size and perceived procedural justice, significantly explain differences in compensation. Work experience, perception of procedural justice, and size of employee department positively influence compensation, while single employees earn less than married employees in the sample.

The result on work experience is consistent with the findings of previous works on career success measured in terms of compensation (Whitely, Dougherty & Dreher, 1991; Whitely & Coetsier, 1993; Supangco, 2001; Forret & Dougherty, 2004; Ng et al., 2005). Higher compensation earned by married individuals is also consistent with Pfeffer and Ross (1982) and Ng et al. (2005), among others.

Table 3: Determinant of Career Success

Independent Variable	Model 1 Compensation	Model 2 Rank Levels from President	Model 3 Career Satisfaction
Work Experience	.345**	-.191**	
Tenure in Position			-.272**
Tenure in First Organization			.233*
Developmental Experience			.278**
Role Clarity			.379**
Procedural Justice	.258**		
Employees in Department	.196*		
Employees in Organization		.396**	
Civil Status	-.382**		
Dummy for Outliers in Rank Level		.680**	
R^2	.567	.659	.414
F	18.661**	37.399**	12.536**
*p<. 05; **p<. 01			

Model 2 explains 65.9 percent of variation in rank levels. Both individual and organizational factors account for differences in the rank levels of employees. Distance from the topmost position in the organization is inversely related to work experience and positively related to organizational size. The latter is consistent with Supangco (2001) and Whitely and Coetsier (1993).

Model 3 explains 41.4 percent of variation in career satisfaction. Two individual factors (tenure in first organization and tenure in position) and two organizational factors (role clarity and developmental experience) explain differences in career satisfaction. Tenure in first organization is directly related to career satisfaction, but tenure in position is inversely related to it. Both developmental experiences and role clarity positively influence career satisfaction. The influence of developmental experience is consistent with the findings of Supangco (2010), which found a positive effect of developmental experience on career satisfaction in addition to supervisory support and perceived organizational support.

Discussion

The only common predictor between the two measures of objective career success is work experience, which is a human capital variable. From the human capital perspective (Becker, 1975) work experience provides an individual specific knowledge and skills that are valuable to the organization providing such, thus the individual enjoys rewards either through higher compensation or hierarchical status.

The model explaining compensation also shows that, on average, single employees earn less than married employees. Such result is consistent with findings of Judge and Bretz (1994) and Pfeffer and Ross (1982). To the extent that married employees are perceived to be more responsible (Pfeffer & Ross, 1982) and decide based on several concerns including family responsibility (Huang, Lin & Chuang, 2006), they are given more opportunities for career success. But when added family responsibility is expressed as a motivation to work longer hours and accept more difficult assignments, being married becomes a human capital variable signaling willingness to work long hours and accept difficult assignments. Size of the department is also positively related to compensation. The size of the department is an indication of its importance to the organization, thus signaling its ability to pay its employees (Whitely, Dougherty & Dreher, 1991). From the resource dependence perspective, it is argued that organizations are able to recruit better workers when they are presented with a wider source of talents. This argument can be extended to departments within organizations. Organizations or core departments within an organization may engage in activities that enhance its control over resources, or develop their substitutes (Pfeffer & Salancik, 1978). For example, in ensuring the control of human resources that are more critical in private institutions than in public organizations, incumbents in such positions were paid relatively higher in the former compared to the latter (Pfeffer & Davis-Blake, 1987). Another factor that positively influences compensation is procedural justice. To the extent that employees are given a say in important aspects of making decisions, they exercise control over the outcome of their work, including performance and rewards. Exercising voice over aspects of work may result in equitable outcome, in enhancing control of favorable outcomes, or simply in leading to desired outcomes (Greenberg, 1990).

Work experience and organizational size explain hierarchical success, measured in terms of the number of level from the company president. This finding is consistent with the findings of Supangco (2001). Other things being equal, those who work in larger organizations are positioned farther from the company president. Larger organizations exhibit greater vertical complexity (Child, 1974). Although there may be more promotion opportunities in larger organizations, the steps to the top may also be longer (Whitely & Coetsier, 1993).

Subjective career success measured in terms of career satisfaction is explained by individual factors such as tenure in first job and tenure in position, and by organizational factors such as developmental experiences and role clarity. Tenure in first job is positively related to career satisfaction. Tenure in first job is an indicator of early career success. Employees who are

not promoted have the tendency to entertain withdrawal intentions and behaviors (Johnston et al., 1993). In addition, early career success facilitates late career success (Dreher & Bretz, 1991). Employees who experience early career success are seen by others more favorably; they also develop a strong sense of self-efficacy that enables further successes (Rosenbaum, 1984). On the other hand, employees who particularly track their own career advancement provide a timetable for them to be in a position. Staying in a position for too long creates a feeling of stagnation in one's career. When one is in a position for too long, one entertains withdrawal thoughts and behavior. Indeed, employees at ceiling position have higher tendency to leave their organization when they have stayed too long in a position (Zhao & Zhou, 2008). Moreover, developmental experiences positively influence career satisfaction. This result is consistent with Ng et al. (2005) and Supangco (2010). Blau (1964) argued that behaviors and attitudes in social exchanges in organizations are governed by the norm of reciprocity. When organizations provide avenues through which employees exercise their abilities while they satisfy their needs or achieve their expectations, employees reciprocate such actions to the organization (Prince, 2005). These reciprocal behaviors take the form of higher performance, positive attitudes, and greater work satisfaction, among others. Another organizational factor explaining career satisfaction In addition, role clarity is directly related to career satisfaction. To the extent that role clarity reduces tension, job satisfaction is enhanced (Bedeian & Armenakis, 1981). Employees with clear understanding of their expectations are able to manage the different demands from work and working, thus they experience higher career satisfaction.

CONCLUSION AND DIRECTIONS FOR FUTURE RESEARCH

This study identified organizational and individual determinants of career success. Objective career success was measured in terms of total annual compensation and number of rank levels from the company president, while subjective career success was measured in terms of career satisfaction. These measures are not correlated with each other, consistent with studies of Korman, Wittig-Berman, and Lang (1981) and Supangco (2010).

Both organizational and individual factors determine career success. Moreover, the three measures of career success generally have their distinct determinants. The result is consistent with studies that looked at objective and subjective career success (Ng et al., 2005; Supangco, 2010) and even those that looked only at objective career success (Whitely, Dougherty & Dreher, 1991; Daley, 1996; Supangco, 2001).

Organizational factors that account for differences in annual compensation are department size, which signifies resource capability of the department to offer higher compensation, and procedural justice, which affords an environment that offers employees the opportunity to have a say in aspects of their work, enabling them to have control over favorable career outcomes. Individual factors include work experience and marital status, where married employees receive higher compensation. Work experience provides employees knowledge,

skills, and relationships that enable them to perform better and get more rewards. The added responsibility of being a married employee provides reason for employees to work harder and accept more challenging assignments.

Number of levels from the company president is also explained by work experience. The longer the work experience, the more knowledge, skills, and relationships an employee has gained and the closer the employee is to the topmost position in the organization. Organizational size provides the structural framework in the career ladder. The larger the organization, the more vertically complex it is, thus more steps in the career ladder to climb.

Determinants of career satisfaction also come from organizational and individual factors. Organizational factors include employees' perception of the developmental experiences provided by the organization and role clarity. Tenure in first job signifying early career success positively impacts on career satisfaction while tenure in current position, where long tenure creates a feeling of stagnation, negatively influences career satisfaction.

While the different measures of success possess different determinants, the results clearly show that career success depends on the actions of both the organization and the individual.

This study has several limitations. For one, the sample of the study consists of MBA students from the University of the Philippines. As such, they may not necessarily represent the cross section of the working population in the country. That they are in the MBA program of the University of the Philippines speaks of their above-average cognitive ability, given the stringent selection procedure of the program. Some of these students are part-time students, which actually speaks of their superior ability to balance the demands of work, the MBA program, and other aspects of their lives. Using homogeneous group of an all-MBA sample also precludes the use of education as an explanatory variable. Another limitation of the study is its cross-sectional design, which limits conclusion regarding causality. This study does not also include variables on personality dimensions, which could have better captured the complexity of career success. This can be an area of future research.

Gender did not explain variation in total compensation, consistent with Supangco (2001) and Supangco (2010); number of levels from the company president, consistent with Supangco 2010), but not with Supangco (2001); and career satisfaction, consistent with Supangco (2010). These null results have several implications. First, there exist income and status parity between female and male MBA students. Second, it challenges the generalizability of findings on gender differential in income, status, and career satisfaction common in studies based on samples from the United States and Europe. These results point to an interesting area of cross-cultural research on career success.

In Supangco (2001), women were farther from the top compared to men. In this study, such difference has vanished. A longitudinal research or an equivalent design may be done in order to determine whether or not hierarchical success of women has improved over time.

Despite the above limitations, this exploratory study has provided us empirical results of factors affecting career success of a sample of MBA students in the Philippine setting. Some

results have indeed proven stable over time. Still developing theoretical models of career success is now in order.

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THE IMPACT OF ACCOUNTING FOR ASSET RETIREMENT OBLIGATION ON SMALLER AND MEDIUMSIZED ENTITIES

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ABSTRACT

Following SFAS 143 and IAS 16 and IAS 37, the Accounting Standards Board of Japan released the Accounting Standard for Asset Retirement Obligations (Statement No.18) and its Guidance (Guidance No.21) in 2008. They require that an asset retirement obligation shall be recognized and its retirement cost be included in the cost of the relevant tangible asset by the same amount. However, the Japanese Financial Instruments and Exchange Act does not require small and medium-sized entities (SMEs) to apply these rules at present. We suggest that their voluntary recognition of the fair value of a liability for an asset retirement obligation is necessary towards maintaining a sustainable society. Considering the users of financial reporting of SMEs', it is significant that the Corporation Tax Law does not allow the accounting provision.

INTRODUCTION

Osaka Prefecture is located at the approximate center of Japan and has a population of 8.8 million, or roughly 7 per cent of the entire population of the country, making it the third most populous prefecture after Tokyo and Kanagawa Prefectures (Osaka Prefectural Government, 2011). In this study, we research the refrigerated warehouse industry in Osaka. According to the secretariat of the Osaka Association of Refrigerated Warehouses (Association henceforce) and its homepages, there are 54 corporations (78 businesses) operating at least one refrigerated warehouse in Osaka, and nearly a hundred per cent of the members of the Association, which is one of the 47 regional members of the Japan Association of Refrigerated Warehouse, Incorporated (Japan Association of Refrigerated Warehouse, 2011), are small and medium-sized entities (SMEs henceforce) on October 20, 2010.

Today, the refrigerated warehouse SMEs are using obsolescent properties, plants and equipment because it is not easy for those to be renewed. The Association, in particular, referred to it as a vital issue to 'diagnose' an antiquated refrigerated warehouse at a conference on March 12, 2010 (Association, 2011). One example concerns an energy-saving diagnosis which revealed that a high-pressure transformer in use had contained a harmful substance, polychlorinated biphenyl. Another example is a 'hoist', a piece of equipment used for lifting heavy things, or for

lifting people who cannot stand or walk (Oxford, 2005). On a hoist, therefore, we interviewed the management of the six member SMEs of the Association. The results of those interviews are outlined below.

To begin with, the managers had no ideas about an asset retirement obligation before the interviews. It was certain that the hoists had been installed legally many years prior. However, that year's Notification No.3968 'the Measure against an Elevator Installed Illegally' (January 27, 2010) of the Japanese Ministry of Land, Infrastructure, Transport and Tourism, Housing Bureau, Building Guidance Division (Notification No.3968) might regard some of the hoists as illegal at present. Years ago, the hoists were installed into a workplace or a factory without tests or verifications pursuant to the provisions of the Building Standard Law (Act No.201 of 1950) while they are provided by the Law. The removal of the hoists in use would prevent the SMEs from operating and would oblige them to provide a significant amount of much money to remove and then to install them newly. Regardless of these concerns, the managers understood that the warehouse enhancement could lead to compliance with the legal requirements, as well as contribute to solution, to environmental problems, by, for example, reducing the amount of electricity generating CO2 from fuel combustion.

ACCOUNTING STANDARDS FOR ASSET RETIREMENT OBLIGATION

On March 1 and 2, 2006 in Tokyo, the Accounting Standards Board of Japan (ASBJ henceforce) and the International Accounting Standards Board (IASB henceforce) held their third joint meeting aimed at the final goal of achieving convergence between Japanese GAAP and International Financial Reporting Standards (IFRS henceforce) (ASBJ, 2006). The ASBJ and the IASB shared with each other the progress that has been made on the first six items on their agenda: valuation method of inventories, segment reporting, related party disclosures, uniformity of accounting policies on overseas subsidiaries, investment property, and cost of issuing new shares. Seeing that the deliberations on these items are making steady progress towards convergence, the ASBJ and the IASB agreed to add three items as follows: asset retirement obligation, construction contracts, and disclosure of financial instruments at fair value.

In Japan, except for in a few cases such as reserve for decommissioning costs of nuclear power units of an electric power company (e.g., Tokyo Electric Power Company, 1989, p.35), the accounting treatment that recognizes an asset retirement obligation as a liability and includes the asset retirement cost corresponding to it in the cost of a tangible fixed asset, as required by the global accounting standards, has not been adopted (ASBJ, 2008a, par.22). As shown in Table 1, on March 25, 2008, at the 149th ASBJ meeting, the ASBJ approved the Statement No.18, Accounting Standard for Asset Retirement Obligations (Statement No.18 henceforce) and the Guidance No.21, Guidance on Accounting Standard for Asset Retirement Obligations (Guidance No.21 henceforce), for public release, which shall be applied to fiscal years beginning on or after

April 1, 2010, or may be to applied to fiscal years beginning prior to April 1, 2010 (ASBJ, 2008a, par.17).

On December 27, 2007, prior to the publication of the Statement No.18 and the Guidance No.21, the ASBJ published exposure drafts of the Accounting Standards and of the Guidance, to solicit public comments on the drafts, and then reviewed the comments received and revised parts of the drafts.

Table 1: ASBJ's Documents on Asset Retirement Obligation

Date	Name of document
2007.05.30	Issue paper on Accounting for Asset Retirement Obligation
2007.12.27	Exposure Draft No.23: Accounting Standard for Asset Retirement Obligations Exposure Draft No.27: Guidance on Accounting Standard for Asset Retirement Obligations
2008.03.31	Statement No.18: Accounting Standard for Asset Retirement Obligations Guidance No.21: Guidance on Accounting Standard for Asset Retirement Obligations Release of Public Comments on Exposure Draft No.23 and Exposure Draft No.27

The accounting treatment that recognizes an asset retirement obligation as a liability and includes the asset retirement cost corresponding to it in the cost of a tangible fixed asset, as required by the global accounting standards, has been adopted in Japan, taking into consideration the argument that it is useful as investment information to project future expenditures would be required for removal of tangible fixed assets in financial statements.

The Statement No.18 defines an asset retirement obligation as a statutory or similar obligation under a statute or contract with regard to the removal of the tangible fixed asset and is incurred when the tangible fixed asset is acquired, constructed, developed or used in an ordinary way (par.3(1)). Yanaga (2009) categorizes the obligation into three groups: a statutory obligation under a statute, a statutory obligation under a contract, and a similar obligation. Moreover, he illustrates the first group by the reserve for decommissioning costs of nuclear power units, polychlorinated biphenyl and asbestos. We consider that some hoist used by a refrigerated warehouse will be grouped with the same one.

A hoist is not necessarily regarded as illegal. The Article 1(ix) of the Enforcement Order of the Industrial Safety and Health Act (Cabinet Order No.318 of 1972) defines a hoist as a light capacity lift. The light capacity lift shall be defined as, among elevators (limited to the elevators installed in the workplaces of entities listed in item (1) to (5) of Appended Table 1 of the Labor Standards Act (Act No. 49 of 1947), excluding stage lifting equipment used at theater, lifting facilities on ships subject to the Ship Safety Act (Act No.11 of 1933) and installed mainly for use by the general public), those intended only for carrying cargos and having a cage with a floor area of 1 m2 or less and the ceiling height of 1.2 m or less.

If a hoist which was installed in obedience to the Labor Standards Act at that time hurts an employee, then the manager of it would have to report it to the local governments. First, the manager will get administrative guidance of the Enforcement Order of the Industrial Safety and Health Act, and, the next, of the Building Standard Law. According to our personal interviews with five local governments, it is barely and certainly possible that the hoist is illegal under the Enforcement Order of the Industrial Safety and Health Act while it obeys the Building Standard Law.

The Statement No.18 provides that 'an asset retirement obligation' is a statutory or similar obligation with regard to the removal of tangible fixed assets and is incurred when tangible fixed assets are acquired, constructed, developed or used in an ordinary way. In addition to the obligation of removal of tangible fixed assets, this statutory obligation or similar obligation requires the removal of hazardous substances, etc., contained in tangible fixed assets, using a method stipulated by law, etc., upon the removal of the tangible fixed assets, even though there may not be any obligation concerning the removal of the tangible fixed assets themselves (par.3(1)). Here we consider some hoist used by a refrigerated warehouse in fact as asset retirement obligation.

In accounting practices, the number of the environmental items presented on the balance sheet has been increasing in Japan. Ogawa (2008) indicates that 219 listed companies, including refrigerated warehouse companies, reported these items in 2008 by contrast with 33 companies in 2001 and 76 companies in 2005.

Table 2: The Impact of the First-Time Adoption of the Statement No.18

Name of company	Kyokuyo	Maruha	Nichirei	Nippon	Toyo	Yokohama
Number of employees*	2,700	13,741	8,282	10,963	4,141	1,108
Shareholder's equity**	18,357	74,183	121,507	64,672	178,151	56,265
Net sales***	125,465	640,348	337,107	370,338	231,324	34,317
Operating income***	1,451	17,037	15,109	7,806	26,394	1,548
Ordinary income***	1,646	14,963	14,625	5,644	21,688	1,608
Loss on adjustment for changes of accounting standard for asset retirement obligations***	27	74	798	387	254	132
Net income***	618	6,962	8,702	2,192	12,419	863

*Toyo Keizai (2011).
**Millions of Japanese yen. Quarterly securities report of each company. As of end-3Q FY3/11 except Yokohama as of end-1Q FY9/11.
*** Millions of Japanese yen. Quarterly securities report of each company. 1Q-3Q FY3/11 except Yokohama 1Q FY9/11.

The Statement No.18 shall be applied to fiscal years beginning on or after April 1, 2010. Table 2 reveals the practices of the listed companies whose director is in charge of an officer of the Japan Association of Refrigerated Warehouse, Incorporated, the Kyokuyo Co., Ltd., the Maruha Nichiro Holdings, Inc., the Nichirei Corporation, the Nippon Suisan Kaisha, Ltd., the Toyo Suisan Kaisha, Ltd. and the Yokohama Reito Co. None of them did apply the Statement No.18 earlier. As a result of the adoption of the Statement No.18, all of them have accounted for their asset retirement obligations on their financial statements. However, Table 2 shows that the impact is relatively smaller. After measurement in terms of annual figures, the asset retirement obligation loss - ordinary income ratio is: the average of 2.3%, the largest of 5.1% of the Nippon Suisan Kaisha, Ltd., and the smallest of 0.4% of the Maruha Nichiro Holdings, Inc.

BUSINESS ACCOUNTING SYSTEM OF SMES IN JAPAN

Accounting laws and standards of SMEs

Even though the Statement No.18 may apply to a hoist operating in an SME, the SME shall not treat it as such in accounting, for the Financial Instruments and Exchange Acts (Act No.25 of 1948) is not applicable to the SMEs because of their small size as provided by the laws. Japanese entities are categorized into four groups (Business Accounting Deliberation Council, 2008): the first one of about 3,900 listed companies, the second one of about 1,000 companies, except for the first, required to prepare and present a securities report in the Financial Instruments and Exchange Acts, the third one of about 10,000 large companies in the Companies Act (Act No.86 of 2005), except for the first and the second, either whose amount of the capital stock is 500 million yen or more or whose total amount of the liabilities is 20 billion yen or more, and the fourth one of about 2,5000,000 stock companies, SMEs in fact, except for the first, the second and the third.

Pursuant to the provision of the Companies Act, the accounting for a stock company shall be subject to the business accounting practices generally accepted as fair and appropriate (Art.431). The Article 2(3) and 75(2) of the Ministerial Ordinance of Justice 'Companies Calculation Regulation' (MOJ Ordinance No.18 of 2006), state that an asset retirement obligation shall be recognized as a liability at the time that the tangible fixed asset is incurred by its acquisition, construction, development or ordinary use. In such cases, there is no difference between the accounting treatment of an asset retirement obligation as stipulated in the Financial Instruments and Exchange Acts or in the Companies Act.

The accounting treatment of an asset retirement obligation is, however, not necessarily applicable to the companies of the fourth group, SMEs, because of these two reasons. First, neither the Financial Instruments and Exchange Acts nor the Companies Act require the financial accounts of an entity categorized into the fourth group to be audited by a certified public accountant. Instead, an SME is encouraged to apply the Guidance on Accounting Standards of

Small and Medium-Sized Business Entities (SMBE Guidance henceforce), first published in 2005 and since then revised annually by the Japan Federation of Certified Public Tax Accountants' Associations, the Japanese Institute of Certified Public Accountants, the Japan Chamber of Commerce and Industry and the ASBJ.

On the other hand, the SMBE Guidance is not a law, so an SME has only to apply it optionally and is not required to adopt it. The SMBE Guidance deals with accounting treatments, notes, and so on, which are encouraged to be complied with in preparing the financial accounts of an SME (par.3). According to the current version of the SMBE Guidance, an asset retirement obligation is the agenda. The paragraph 89 describes that the accounting treatment of an asset retirement obligation be examined continually in future, considering its establishment in the Japanese GAAP.

The Impact of the Statement No.18 on SMEs' Financial Statements

The SMEs in Table 3 are members of the Association and their financial statements are separate and not disclosed for public because they are not listed. Table 3 shows that the impact of the Statement No. 18 on SMEs' financial statements is much larger than listed companies shown in Table 2. The Company C, E and F has an illegal hoist, that is, asset retirement obligation, which will cost three millions yen to be removed. The adoption of the Statement No.18 will result in decrease in net income: 19.5 % of the Company C, 87.2 % of the Company E, and 43.8% of the Company F.

Table 3: The Impact of the First-Time Adoption of the Statement No.18 on SMEs

Name of company*	Company A	Company B	Company C	Company D	Company E	Company F
Number of employees**	190	170	20	27	22	11
Shareholder's equity**	226	135	20	16	30	10
Net sales***	3,276	1,434	186	167	165	107
Net income***	1.316	6.547	16.250	(21.612)	3.440	6.850
Adoption of Statement No.18						
Loss on adjustment for changes of accounting standard for asset retirement obligations****	0	0	3	0	3	3
Net income	1.316	6.547	13.250	(21.612)	0.440	3.850

* FY3/10 of Company A, FY9/10 of B and FY12/10 of the others.
**Homepage of each company and Teikoku Data Bank.
***Millions of Japanese yen. Teikoku Data Bank.
****Interviews with management.

Their managers seem not to desire these results. Statement No.18 provides that 'an asset retirement obligation' is a statutory or similar obligation with regard to the removal of tangible fixed assets and is incurred when tangible fixed assets are acquired, constructed, developed or used in an ordinary way. In addition to the obligation of removal of tangible fixed assets, this statutory obligation or similar obligation requires the removal of hazardous substances, etc., contained in tangible fixed assets, using a method stipulated by law, etc., upon the removal of the tangible fixed assets, even though there may not be any obligation concerning the removal of the tangible fixed assets themselves (par.3(1)). 'Retirement' of a tangible fixed asset means cessation of use of the tangible fixed asset (excluding temporary cessation). However, becoming idle does not apply to the 'retirement' (par.3(2)).

At present, antiquate hoists are in operation in refrigerated warehouse in Osaka. Even if the Notification No.3968 considers a hoist to be illegal, shall the management of the SME using the hoist regard it as such on business circumstances? The difficulty lies in the fact that the SME cannot operate its business without the hoist. In order to avoid the recognition of the asset retirement obligation, the hoist might be, in some cases, observed as a breach in the Labor Standards Law though it is forbidden by the Building Standard Law. Some of the requirements of the related laws differ from each other at present. Additionally, be effectively abusing the exception clause on an idle asset of the Statement No.18 as well as without auditing, the SME could leave the hoist idle in legal forms to avoid the recognition.

The Statement No.18 provides that an asset retirement obligation is recognized as a liability at the time that the tangible fixed asset is incurred by its acquisition, construction, development or ordinary use (par.4). However, in cases where the amount of the obligation cannot be reasonably estimated at the time it is incurred, the obligation is not recognized, but shall be recognized as a liability when it becomes possible to reasonably estimate the amount of the obligation (par.5).

Presently, the estimation standard is too high qualitatively for an SME to apply it to itself. The limited human resources will not enable the amount of an asset retirement obligation to be estimated reasonably. Therefore, it is necessary for the SME to commission a constructor to estimate it reasonably. However, who will feel secure as to the reasonable estimation of the constructor without auditing, governance or control? A reliability mechanism may initiate the reasonable estimation process in conformity with Japanese GAAP.

The Statement No.18 provides that at the time that an asset retirement obligation is incurred, the undiscounted future cash flow required for removal of the relevant tangible fixed asset is estimated, and then the discounted amount (discounted value) is calculated (par.6). In case of substantial change in the estimated undiscounted future cash flow, the consequent adjustment is added to or reduced from the book values of the asset retirement obligation and of the relevant tangible fixed asset by the same amount. This applies to asset retirement obligations newly incurred for reasons such as revision of related laws (par.10).

Currently, the above estimation of the undiscounted future cash flow required for removal of a tangible fixed asset appears to be similar to determination of the acquisition price of a debt in a bulk sale of an investment bank. An SME requests various constructors to estimate the undiscounted future cash flow required for removal of a tangible fixed asset. As is often the case, their estimates vary as a result of differences in their removal procedures, their estimated costs or their expected values of a scenario. The SME selects an estimate from the constructor which most reasonably meets its requirements. In case where the number of the constructors is limited, the SME might occasionally apply pressure on a constructor to give an arbitrary estimate. No one is likely to feel secure as to the calculation of asset retirement obligation of the constructor without auditing and internal control. A reliability mechanism may initiate the calculation process in conformity with Japanese GAAP.

The Users of SMEs' Financial Statements and their Information Needs

The IASB framework (Framework henceforce) prescribes that the users of financial statements include present and potential investors, employees, lenders, suppliers and other trade creditors, customers, governments and their agencies and the public (2001, par.9). And according to Ernst & Young ShinNihon L.L.C. (2010, p.13) as well as our experience, investors, lenders and governments and their agencies are most important among the IASB's users of financial statements in case of an SME.

The investors characterize the essential features of an SME's general purpose financial statements. As is often the case with a family entity, investors in an SME are at the same time their management, that is, the outside users of financial statements are at the same time the inside providers of financial statements. The Framework (par.11) prescribes that the management of an entity has the primary responsibility for the preparation and presentation of the financial statements of the entity. Management is interested in the information contained in the financial statements even though it has access to additional management and financial information that helps it carry out its planning, decision-making and control responsibilities. Management has the ability to determine the form and content of such additional information in order to meet its own needs. The investors, as stated in the Framework (par.9), are the providers of risk capital who are concerned with the risk inherent in, and return provided by, their investment. The investors need information to help them determine whether they should buy, hold or sell and also to enable them to assess the ability of the entity to pay dividends.

Presently, it is certain that the Framework may benefit outside investors as a whole, but it will not always benefit insider investors. The management of the family entity would like to continue to manage the SME in order to maintain it is a going concern. In addition, it is not relatively important for an SME to pay dividends insofar as the SME is considered a family in Japanese society.

As to the accounting treatment of an asset retirement obligation, we have researched on the views held by the significant users of the financial statements of an SME, the lenders and governments as the Framework states. In addition, we have studied the investment funds because the number of those funds has been increasing in Japan.

The Framework prescribes that lenders are interested in information that enables them to determine whether their loans, and the interest attaching to them, will be paid when due (par.9). In order to know how Japanese lenders think of SME accounts, after interviewing anonymous managers of anonymous seven banks, we researched loan arrangements for SMEs' of Japanese financial institutions. According to their homepages (e.g., Bank of Tokyo-Mitsubishi UFJ; Japan Financial Corporation; Credit Guarantee Corporation of Osaka-Fu), it appears to be usual for banks, including other governmental agencies, to request SMEs to present their financial statements or corporation tax final return for latest two or three years in order to decide whether or not they should finance the SMEs. However, we could not find a relationship between those financial results and asset retirement obligations.

We only guess that banks do not require any SME to recognize the asset retirement obligation in the accounts. When they make a loan, they will test a loan for contamination so as to secure the collateral value adequate to the loan and it is not until in confirmation of the collateral that they will check up on the financial accounts as to whether the costs of removing the item is reserved. If they presently allow an SME to ignore an asset retirement obligation, except for their collateral for a loan, so in the future they won't order an SME to recognize the obligation as a liability as long as the application of the SMBE Guidance is encouraged and optional. It is not until the SMBE Guidance prescribing recognition of an asset retirement obligation is enforceable by law that lenders will require an SME to recognize the obligation in its financial accounts.

Over the years, turnaround funds have been set up increasingly in Japan. Only when a foreign venture capital firm provides funding to a Japanese SME across international borders, the firm would like the SME's financial statements of entities in other countries, as well as in Japan (See IASB, 2007, BC16(e)).

Then, in order to decide whether or not the firm will invest in an SME, the accounting treatment of the Statement No.18 that an asset retirement obligation is recognized as a liability at the time that the tangible fixed asset is incurred by its acquisition, construction, development or ordinary use might be important because the accounting treatment of Statement No.18 is similar to that of the global accounting standards, including the International Accounting Standard 16, Property, Plant and Equipment and the Statement of Financial Accounting Standard 147, Accounting for Asset Retirement Obligations.

RESERVE EFFECT OF TAX

The Framework notes that governments and their agencies require information in order to regulate the activities of entities, determine taxation policies, and as the basis for national income and similar statistics (par.9(e)). On the other hand, special purpose financial reports, such as prospectuses and computations prepared for taxation purposes, are outside the scope of the Framework (par.6).

According to the Japanese SMBE Guidance (par.1), the business accounting standards generally accepted as fair and appropriate are a component part of the business accounting practices generally accepted as fair and appropriate in the Companies Acts (Article 431). Considering characteristics of an SME, in some cases, the business accounting standards generally accepted as fair and appropriate provide easier accounting treatment. In cases where the business accounting standards generally accepted as fair and appropriate do not prescribe any concrete accounting treatment, an entity refers to the treatments in the Corporation Tax Act (Act No.34 of 1965) as such practically (par.1). The accounting treatment of an asset retirement obligation of an SME may apply in such cases.

In accordance with Statement No.18, an asset retirement obligation is recognized as a liability at the time that the tangible fixed asset is incurred by its acquisition, construction, development or ordinary use (par.4). On the other hand, the Corporation Tax Act does not consider the asset retirement obligation recognized as a liability in accounting to be a debt in law on the definite liabilities principle (Article 22(3)(ii)).

In other words, the asset retirement obligation recognized as a liability in accounting has not yet qualified for the debt in law because the amount and /or timing of the expenditure for the obligation has not yet been determined, even though the obligator's implementation of the removal is surely a legal obligation. Therefore, in the calculation of the amount of the corporation's income for the business year when the obligation is recognized as a liability, the entity shall include the same amount as the liability in the amount of gross profit in the adjustment for taxable income.

The amount equivalent to the asset retirement cost corresponding to the obligation recognized as a liability can neither apply neither to its purchase price, including any expenditure necessary for the purchase, nor to any cost directly attributable to bringing the asset to the location and condition necessary for it to be capable of operating in the manner intended by management, pursuant to the provision of Article 54(1)(i) of the Corporation Tax Act. Accordingly, the Corporation Tax Act does not take into account the amount equivalent to the asset retirement cost as an element of the acquisition cost. Therefore, the Corporation Tax Act does not take into account the amount of the corporation's income for the business year when the equivalent amount is recognized as an asset, and when the entity shall include the same amount in the amount of gross loss in the adjustment for taxable income.

The 1947 amendments of The Corporation Tax Act made it clear that corporate income tax should be computed based upon the income determined under the computation rules of the Commercial Law. However, it does not consider the asset retirement obligation recognized as a liability in accounting to be a debt in law on the definite liabilities principle. The business accounting standards generally accepted as fair and appropriate are not always regarded as fair and appropriate in the Corporate Tax Act as shown by precedents as to the article 22: June 25, 1981 at the Kobe District Court, December 19, 1991 at the Osaka High Court and November 25, 1993 at the Supreme Court.

Professor Kaneko indicates that the business accounting standards generally accepted as fair and appropriate are not always regarded as fair and appropriate in the Corporate Tax Act as shown by precedent (Kaneko, 2009, pp.264-266). In addition, professor Koyama notes that the Corporation Tax Act will never accept the accounting treatment of an asset retirement obligation on the definite liabilities principle (Article 22(3)) and the fair taxation, as long as the estimation process of the undiscounted future cash flow required for removal of the relevant tangible fixed asset contains some subjective elements (Koyama, 2010, p.120).

In such cases, the treatment of the asset retirement obligation shall apply to instances where it is otherwise provided for in the articles of the Corporation Tax Act (Article 22(4)). As a result of the reverse effect of tax on accounting (See, Macharzina and Langer, 2004, p.252), it will be impossible for an SME to apply the accounting treatments of the Statement No.18.

CONCLUSIONS

A conflict between legal requirements and business ethics has been spreading into managers of refrigerated warehouse SMEs, who are faced with an asset retirement obligation. In order to maintain a sustainable society, an SME shall adopt the SMBE Guidance which provides the same accounting treatments as the Statement No.18. The Corporation Tax Act should consider obligation recognized as a liability in accounting to be a debt in law. All rules related must be consistent with each other and enable SMEs to remove an asset in practice. Managers have to make effort to understand global accounting standards as well as national business operations. An increase in foreign investors will enable SMEs to be controlled through financial reporting.

The SME has been using a hoist for years, but in 2010, the Notification No.3968 considers some hoist as illegal but for tests or verifications pursuant to the provisions of the Building Standard Law. Of course, management of SMEs understands that the warehouse enhancement could lead not only to compliance with the legal requirements, but also to potential solutions to environmental problems. On the other hand, it is a fact that the removal of the hoists in use would prevent an SME from operating and should oblige them to provide a significant amount of money to remove and then to install newly.

In Japan, since the ASBJ approved the Statement No.18 and the Guidance No. 21, an entity shall recognize an asset retirement obligation as a liability and include the asset retirement cost corresponding to it in the cost of a tangible fixed asset, as required by the global accounting standards. However, the accounting treatment is not necessarily applicable to a SME. The SMBE Guidance is not a law, so SMEs have only to apply it optionally. Additionally, the SMBE Guidance deals with the treatment as agenda.

In practice, the difficulty lies in the fact that the SME cannot operate its business without the hoist. Even if the Notification No.3968 considers a hoist to be illegal, the management of the SME using the hoist never regards it as such in business terms. In order to avoid the recognition of the asset retirement obligation, the hoist be observed as a breach in the Labor Standards Law. Additionally, in effect abusing the exception clause on an idle asset, the SME could leave the hoist idle in legal forms to avoid the recognition. The SME's limited human resources will not enable the amount of an asset retirement obligation to be estimated reasonably. Therefore, it is necessary for the SME to commission a constructor to estimate it reasonably. However, no one will feel secure as to the reasonable estimation of the constructor without auditing.

Investor in an SME are at the same time their management, so they have the primary responsibility for the preparation and presentation of the financial statements of the entity, and has access to additional management and financial information that helps it carry out its planning, decision-making and control responsibilities. Only when a foreign venture capital firm provides funding to a Japanese SME across international borders, the firm prefers that the SME's financial statements to be comparable to those of like firms. As an outsider, a lender will, in making a loan, test only the collateral for a loan for contamination, so as to secure the collateral value adequate to the loan, and it is not until in confirmation of the collateral that they will check up on the financial accounts to determine whether the costs of removing the item is reserved.

The close relationship between accounting and taxation is more important than the objective of Statement 18. Treatment of the asset retirement obligation shall apply to those cases where it is otherwise provided for in the articles of the Corporation Tax Act. As a result of the reverse effect of tax on accounting, it will be impossible for SMEs to apply the accounting treatments of the Statement No.18. Then, can the financial accounts give a true and fair view? Will environmental problems be solved?

For example, the OECD Guidelines for Multinational Enterprises (2008, p.19) state that enterprises should, within the framework of laws, regulations and administrative practices in the countries in which they operate, and in consideration of relevant international agreements, principles, objectives, and standards, take due account of the need to protect the environment, public health and safety, and generally to conduct their activities in a manner contributing to the wider goal of sustainable development. This is true for any entity regardless of its scale. Considering the characteristics of SMEs in Japan, it is necessary to adjust the relations between accounting and taxation.

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A CONSIDERATION IN DEVELOPING STRATEGIC INFORMATION SYSTEMS THROUGHOUT BUSINESS TRANSFORMATION: A CASE STUDY OF SEIREN CO., LTD.

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ABSTRACT

This paper analyzes product development and business growth as a result of changes in information systems (IS) during a period of business transformation. Since the 1990s, management of corporate IS being made by outsourcing has become a basic business strategy, against a backdrop of theoretical motivation explained by theory of core competence and transaction cost theory. Outsourcing service providers with technical expertise have continued to grow by enjoying economies of scale produced by replicability of IT related products.

However, existing theories that explain IS outsourcing might not be valid in the transition phase of business system (i.e., business model). Instead, we think that there is a possibility in insourcing management to create strategic information system and to achieve more flexible and effective business systems transition than outsourcing management.

The purpose of this research is to find clues of theoretical hypothesis that answer the question how firms develop and maintain their IS that provide competitive advantages at business system transformation by case study. The exploratory case study shows the effectiveness of developing IS in-house. It indicates that (1) the innovative vision of top management advances accumulating business knowledge deeply and widely in organization, and (2) using accumulated knowledge and skills through insourcing management enables the firm to develop unique and effective IS.

In the view of capability-based approach, we conclude that Insourcing (Not Outsourcing) IS development that includes "IS-extensibility" could make the business system transformation more flexible and effective.

INTRODUCTION AND OBJECTIVES

One of the critical issues of any corporation is how it continues to grow and perform successfully. Among stakeholders including customer, shareholders and employees even if they have different and sometimes opposing interests, a lasting positive performance is assumed as a common goal. Under the globalization of competition, ceaseless technological innovations and

diversification of customers' needs, companies are forced to reconstruct their business system in order to survive and prosper.

In this paper, we focus on the management of corporate information systems (IS) in large companies during the period of business transformation. Some researchers pointed out that some researchers pointed out that IS is one of disablers of business transition (Allen & Boynton, 1991; Prahalad & Krishnan, 2008). The purpose of this case study is to find clues of theoretical hypothesis that answer the question how firms develop and maintain their IS which provide them with competitive advantages. IS play a critical role in the overall structure of the business system. The transformation from one particular business system to another is caused by various factors such as globalization and diversification of business, changeover of business category, restructuring and corporate reengineering. In most cases, these transformations require and entail the review of existing IS. At the same time, a review of IS also influences business system. There is interrelated influence between IS and the business system (Inoue, 1998).

LITERATURE REVIEW

One method that business undertakes in order to gain competitive advantage is to establish a review of IS. However, establishing a competitive advantage is not solely done by the introduction of new IS itself, although, in recent years, it is becoming more difficult to complete various business tasks without utilizing IS. For instance, the introduction and management of IS has flourished in human resource management and in accounting. In the same way, production planning and supply chain management also requires IS for controlling the flow of both information and goods. IS are necessary and common place, but, the question of whether IS could be a source of competitive advantages or not remain inconclusive in existing literature. On the one hand, some literature suggest that even though it is a business requirement, IS are becoming a commodity without the rarity that is a condition of being a resource of competition advantage thereby diminishing its strategic value (Carr 2003, 2004, 2005, 2008).

Since the 1990s, the effectiveness of outsourcing in order to enhance its core business has received significant attention (e.g., Quinn, 1992). Kotabe & Helsen (2008) pointed out that the cutting costs and focus on core competencies, the use of special expertise and intention to expand sales and profits as the main reason why companies outsource, and that the same is true of IS outsourcing. They also note that especially in Japan by recession, corporate is forced to explore cost savings methods by IS outsourcing.

IS outsourcing has widely penetrated as a basic strategy since 1990s (Dibbern, Goles, Hirschheim & Jayatilaka, 2004; Gonzalez Gasco & Llopis, 2006; Lacity, Khan & Willcocks, 2009). Also King & Malhotra (2000) make specific references to particular functions within IS which tend to be outsourced. Akomode et al. (1998) describes this type of outsourcing as a basic strategy for developing IS for several reasons; cost reduction, inefficiency of developing IS within a company and a lack of technological ability. Since 1990s, IS departments in many

Japanese firms have taken a less hands-on approach to IS preferring to out-source roles which includes planning, constructing, designing, developing, implementing and maintaining to outside specialized companies such as "service providers" like IBM, in whole or in part, otherwise sale the IS department or form a capital alliance with a specialized affiliate company.

Through various approaches a body of work pertaining to the outsourcing of IS has been established. While economic theories explain its efficiency in terms of scale economics and transaction costs (Coase 1937; Williamson, 1975) , diversified procurement frameworks ranging from internalization, intermediated organization (pseudo-outsourcing) and internal market within the organization have been proposed (Yoshida, Yoda and Minami 2009).

In contrast, some literatures suggests that IS are strategically important for achieving a competitive advantage for the company (Yoda, 2010). In an extensive literature review, Piccoli and Ives (2005) pointed out the existence of four barriers that serves as obstacles to replication; "IT resource barrier" including both assets and capabilities, "complementary resource barrier" including distribution channels and organizational structure, "IT project barrier" caused by rarity and complexity of technology and "preemption barrier" that consists of switching cost and relationship. Because of these four barriers, IS are not replicable. Specifically, literature on Resource Based View (RBV) regard IS as important as they endow strategic resources when created within a company. In other words, they regard IS not as commodities but as constituting "core competences" (Prahalad & Hamel, 1990). The background of this position is a perspective that knowledge created in organizational processes is an important resource for the company. Penrose (1959) who influenced the theory of Resource Based View pointed out in her book "The Theory of the Growth of the Firm", that knowledge accumulated in organizational processes is an important resource for the growth of the firm. That is, the process of business operation itself creates new knowledge as resource with which managerial services provide ideas to link the emerged knowledge with new production services. Penrose states that this mechanism is one reason why companies grow. Richardson (1972) added the concept of "capability" to Penrose's idea of "managerial service" which makes use of resources. Research focusing on RBV has further developed this field. Leonard-Barton (1992) also adopts a "knowledge based theory" and argues that core capability of a company is a set of knowledge that endows it with competitive advantages. According to Leonard-Barton, core capabilities are distributed along four dimensions: employees' embodied "knowledge and skills" and "procedures and routines", "technical systems" such as IS in which these knowledge and procedures are embedded, "managerial systems" which guide the process of knowledge creation and control, and "the values and norms" that influence all other dimensions. Thus she regards IS as a component of core capabilities strategically important for differentiation of the company. Also Day (1994) focuses on the capabilities to achieve and maintain organizational market orientation also notes that IS play a critical role in the organizational capabilities of the company. Day(1994) defined capabilities as complex bundles of skills together with accumulated knowledge, exercised through organizational process, enabling firms to make use of their assets (Day, 1994: 38). He

argues that in market-driven organizations, their mastery of "market sensing capability" and "customer linking capability" are especially important. Furthermore he maintains that information system plays an essential role in all organizational processes of acquisition, distribution as well as interpretation of market information and coordination with customers. For this perspective, IS are not positioned as commodities procurable on the market, but as a capability of the firm embedded in the organization processes of the firm.

Whether IS are commodities or conversely strategic resources, one may arrive at opposing conclusions depending on which perspective one may adopts; procuring IS as commodities in the market may cost less than developing it in-house, or IS must be developed in organizational process regardless of cost because they are strategic resources. So, integrated discussion has been required (Watjartrakul, 2005). Where and when IS become commodities to be procured at a lower cost, or as component of capabilities built up from within the company endowing it with a competitive advantage is an area we shall look at.

Previous researches indicate that when IS form reciprocal relationship with staff skill and processes within the organization, it has a possibility to bestow unique capabilities or advantages on the company. Leonard-Barton (1992) argues that because a core capability is an interrelated, interdependent knowledge system, it is difficult to separate and change any of the four dimensions which consist of the core capabilities. Even in the case of a new technical system, it will provide inimitable advantage if accompanied by new skills (Leonard-Barton, 1992: 122). Moreover, Day (1994) points out that information technology enables organizations to learn new skills and thus develop new capabilities, promoting transformation of organizational processes. IS capabilities are embedded in organizational processes, and at the same time constituting new organization processes. Because different organizational processes require different capabilities, imitating best practice of another company or procuring IS from the market may not contribute to achieve competitive advantages.

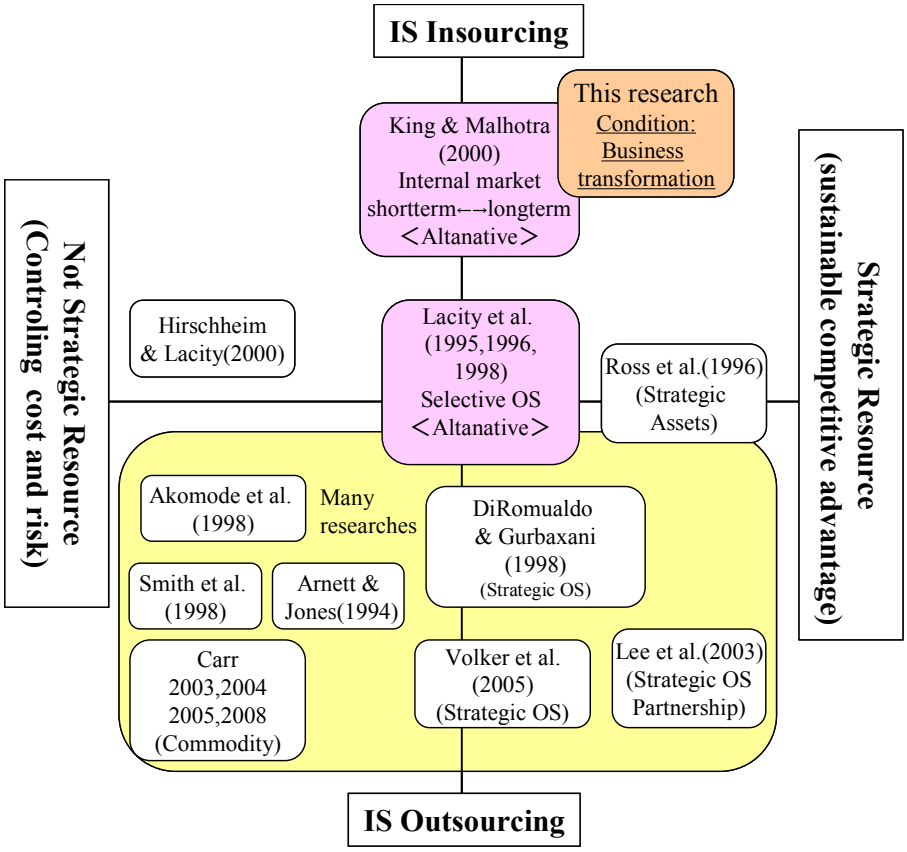
However, a guideline detailing how to develop IS as a capability of the firm, especially at the point of business' transformation, does not yet currently exists in previous literature (Figure 1). We will presently discuss about the management of IS within the framework of business system in transformation through the aid of exploratory case study.

In this study the dominant methodology used is a case study specifically an exploratory case study, aimed at understanding management practices including business backgrounds and an analysis of management decisions. A case study is an effective method for exploratory research allowing us to ask "how" and "why" of high-context phenomena beyond the control of the researcher (Yin, 1994).

The case study approach can be conducted adhering three principles of data collection proposed by Yin (1994), vis-à-vis data correctness. In analyzing this case study, we conducted several interviews with the management[1] and examined published company documents as secondary data. This included literature published by the company, research papers about the textile industry, a company history and articles in newspapers and magazines, in order to gain an

insight into the company and also to validate the primary data by comparing it with secondary data.

Figure 1 The position of this research among previous researches



METHOD

The particular area of research concentrates on SEIREN Co., Ltd. (SEIREN). Founded in 1889 SEIREN has been in business for more than 120 years. Despite its wealth of experience, it was confronted with considerable difficulties caused by the structural depression of the textile industry in the 1970s.

Tatsuo Kawada[2], who assumed the post of president of SEIREN in 1987, was responsible for the company's revolutionary corporate strategy. Subsequently SEIREN expanded its business over the past 20 years, a period marked by a prolonged transition within the business and centered on the development of a new strategic information system Viscotecs (Visual Communication Technology System) which later acquired a business model patent. Viscotecs,

developed in-house[3], integrates SEIREN's know-how in fabric dyeing by allowing quick and easy digital color fabric printing. To understand how SEIREN embarked on the design and implementation of Viscotecs we will first examine SEIREN's objectives and management practices.

CASE STUDY: SEIREN

First we describe the prospect of this case study. This case study has focused on how this company has built up the competitive advantage throughout business change. For long-term transformation over 20 years, we construe this practice historically and meticulously. Particularly as exploratory research, we are focusing on the decisions and actions that lead to sustainable competitive advantage,

By anticipating points of this case study, we are focusing on decisions about the vision of business system transformation centered on the development of a new strategic information system and on actions of consistent "insourcing" IS management. Specifically the new vision will lead to innovative concepts of new IS, and consistent insourcing IS management lead to accumulate strategic resources and combine them in progression. Eventually they were integrated into the new strategic IS to acquire sustainable competitive advantage.

Business Background

In April 1889, during the growth of the silk production in Japan, SEIREN's predecessor, Kyoetsugumi was founded in Fukui prefecture[4]. At that time it was the first company to specialize in degumming row silk. In 1923 it diversified its business into dyeing by establishing a dedicated plant for its dyeing business.

After the prosperous years of the 1960s, the textile industry fell into a structural depression which persisted throughout the 1970s. The decline of Japan's textile industry was rooted in several factors: a voluntary export restraint to the United States, the Japan-US textile agreement, two oil crises and the rapid appreciation of the yen following the Plaza Accord. As a result, SEIREN's future in the textile industry in the early 1980s was in doubt. The textile industry of the time was marked by a host of inefficient systems; production was based on a traditional implementation of division of labor, and the distribution channel from production of row silk to marketing of the end item was overly complicated.

Corporate Transformation

Tatsuo Kawada was installed as the sixth president of SEIREN at a board meeting on August 28th 1987, having been promoted from managing director. President Kawada`s vision for SEIREN was bold; his aim was to revolutionize the company's business by breaking into new markets[5]. The following year in October 1988, Kawada presented his vision of SEIREN's new

corporate strategy. He conceptualized SEIREN as a "high value-added company". He defined SEIREN's business as the creation of value-added materials and products by offering a multi stage process including planning, production and marketing. In addition, he expanded SEIREN's domain from dyeing, which consists of just one process in textile production, into broader markets related to lifestyle products that use textiles[6]. Furthermore, as the structures of production and distribution were changing from an industrial society to an information society, from mass to personal production, on-schedule to on-demand, supplier-driven to user-driven and real to virtual[7], President Kawada embarked on four key strategies: (1) a break away from previous clothes and textiles production, (2) introduction of IT including a vertically integrated system, (3) globalization, (4) transition of corporate culture[8]. For the purpose of this research, we will examine in specific detail the first of these two strategies, namely (1) and (2). Behind the breakaway from clothes and textiles was the aforementioned decline of the domestic textile industry caused by export restraints, appreciation of the yen and the rapid growth of the textile industry in South-East Asian countries. Against this background, Kawada initiated a departure from traditional markets and business practices in a bid to diversify steering SEIREN away from the declining textile industry. The Kawada-led plan would seek instead to use SEIREN's experience and know-how, its fiber processing technologies and material development technologies fostered throughout the company's history in order to break into new markets.

Kawada was responsible for launching the company's incursion into the production of interior materials for automobiles, which subsequently became SEIREN's primary product. SEIREN's involvement in this product was total; from planning to marketing such that it resulted in the company breaking away from its mainstay business, namely the dyeing process. Kawada presented five plans for non-textile products in 1988[9]. The first was "Automotive products" or interior materials, such as aesthetic car seats and ceiling materials as well as other textile-related accessories for automobiles. The second was "High Fashion" including inner clothes, sportswear, interior related materials made from silk, cotton, wool and hemp as well as synthetic fibers like long-fiber polyesters. The third was "Electronics" such as plasma display panels, EMI shielding materials and dust protective sheets. The fourth "Bio-Medical and Industrial" composed of cosmetics and functional clothing. The fifth "Housing" included house walls and curing sheets.
Under Kawada automotive products became the core business of SEIREN. This new relationship lead to new thinking practices within the company as it fostered new relationships with non-textile industries. During the mass motorization period of the 1970s most car seats were made from vinyl chloride material. Automobile manufacturers assumed that good quality textile materials had a lifespan of around 10 years, but, SEIREN believed it was possible to develop longer lasting materials using new textile related technologies. They targeted the automotive industry with prototypes of new car seats. It was at this juncture that SEIREN came face-to-face with practices in the automobile industry. Staff at SEIREN was surprised by the standards in the automobile industry: high-product quality, business systems defined by just-in-time production, and continuous requests for cost reduction and quality improvement at the heart of its business

culture. Business dealings with the automobile industry resulted in the opportunity for SEIREN to recognize the possibility to redefine the position of textile related technologies and the necessity to implement a more efficient business system[10]. In 1975, when SEIREN entered production of car seats, Kawada decided to build an integrated production system in order to respond to the exact requirements from the automobile industry. Kawada foresaw the necessity to assume not only control of the dyeing process but also of related processes including knitting, weaving and sewing.[11].

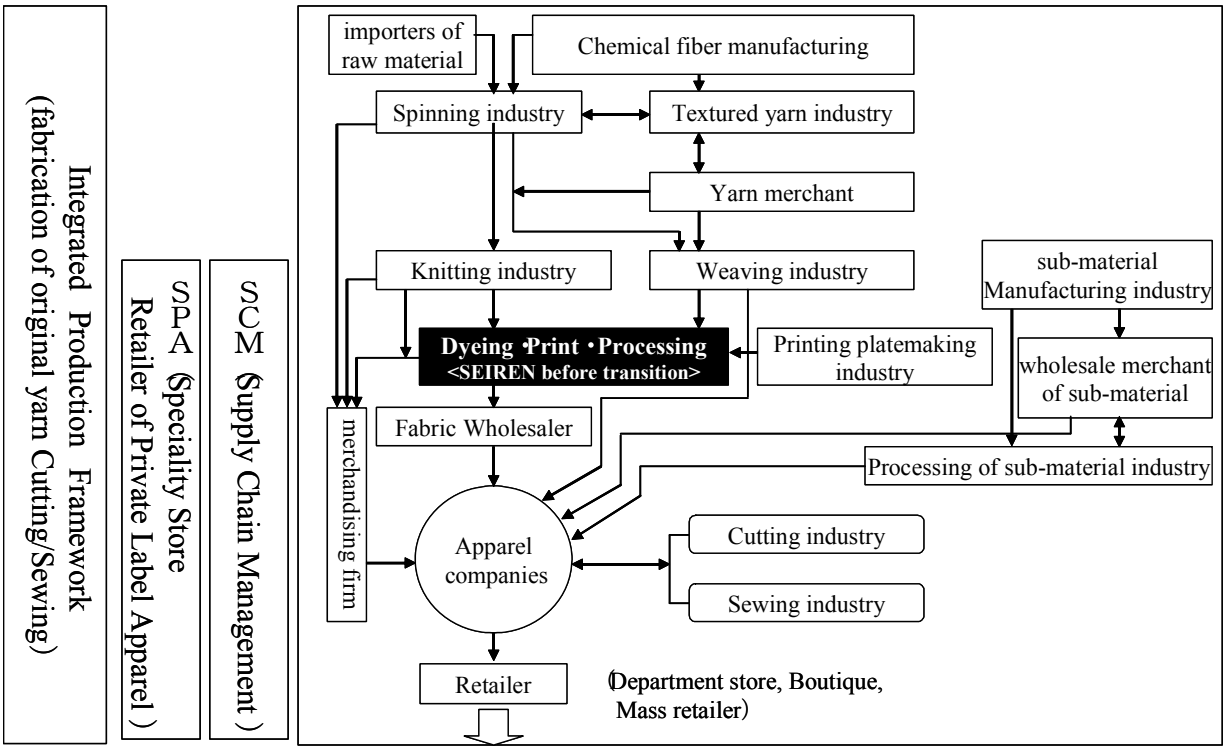
Regarding the second key strategy, SEIREN introduced a vertically integrated system using information technologies. In textile production there are high seasonal variations as raw materials and fabrics such as cotton, wool and silk are harvested during specific seasons. Additionally consumers' preferences for apparel products are constantly changing. Participants in the textile industry traditionally assumed a one year production lead time, resulting in problems such as depletion of stock, hot-selling products, and a buildup of dead stock resulting in high-priced end products. How to adjust production volume in response to various demands and how to manage stocks was a serious problem not just for SEIREN but for the textile industry at large[12].

Furthermore, Japan's textile industry was characterized by a complex division of labor in which each firm assumes piecemeal production during the various processes (see Figure 2).

Before the business transformation, SEIREN had assumed production of only the dyeing process, (see Figure 2). Its primary business was to process orders, without taking inventory risks. In such a structure marked by the proliferation of subcontractors, low risks and low returns, where responsibility for the end products resides is obscure[13].

President Kawada saw that such a complex division of labor coupled with the traditional value chain as barriers to increasing the competitiveness of the Japanese textile industry. He believed in the necessity of introducing a vertically integrated production system in order to develop a new value chain to replace the traditional structure. This vertically integrated production system aimed to reduce losses by producing only hot-selling products during the sales season as opposed to producing the total volume in advance. To implement this system, SEIREN decided to deal with apparel companies and retailers directly, bypassing wholesalers and trading companies. This new business system required a wide variety of products in small quantities, quick delivery and stockless trading on the Net. The aim of this system was to produce only products that would sell, instead of products whose marketability was unknown. SEIREN decided to disregard traditional business practices offering instead its vision which enabled consumers to communicate with manufacturers directly and to get what they wanted when they wanted at a reasonable price.

Figure 2 The outline of the traditional Japanese fiber's business value chain



Source: Internal information by SEIREN Co., Ltd.

Barriers to Business System Transformation

As SEIREN underwent its business system transition, introducing an IT-led vertically integrated system, SEIREN's business partners changed from fabric wholesalers to apparel companies. However, the sales division struggled to procure contracts because of differences in lot sizes.

At the time, the lot size of orders from fabric wholesalers was typically for 2000 meters while the lot size orders for export was 10000 meters. But if SEIREN conducted its business with apparel companies located downstream of the value chain, the lot size of orders would have to be reduced to one-tenth, or about 200 meters. Moreover by pursuing with the traditional dyeing business, it would seem difficult to turn a profit or even emerge above the break-even point[14]. Additionally, one of the bottlenecks in the production of clothes which leads to dead stocks was located in the dyeing process, traditionally assumed by SEIREN. Dyeing is an essential process whereby color is added to fabric which in turn adds value. However, once a

fabric has been dyed it is difficult to divert the product for an alternate use, while a fabric which has not been through the dyeing process can easily be used for other purposes[15].

To resolve this problem, during a product development meeting the engineering department suggested a new method to streamline printmaking[16]. With the traditional method of printmaking, known as the screen system, a proof was required for each color. This was an immensely time-consuming process, during which the customer repeatedly checked the color of the test printing, suggested adjustments, before production finally started. In comparison, the method proposed by the engineering department was a streamlined process in which the customer creates the design, which is scanned and corrected by CAD. The customer-approved design was thus the only design printed on texture to be checked by the customer. By adopting this method, the production costs for test printing could be reduced. At the product development meeting, President Kawada went a step further by asking the engineering department to simplify further the entire process involved in proof-making[17].

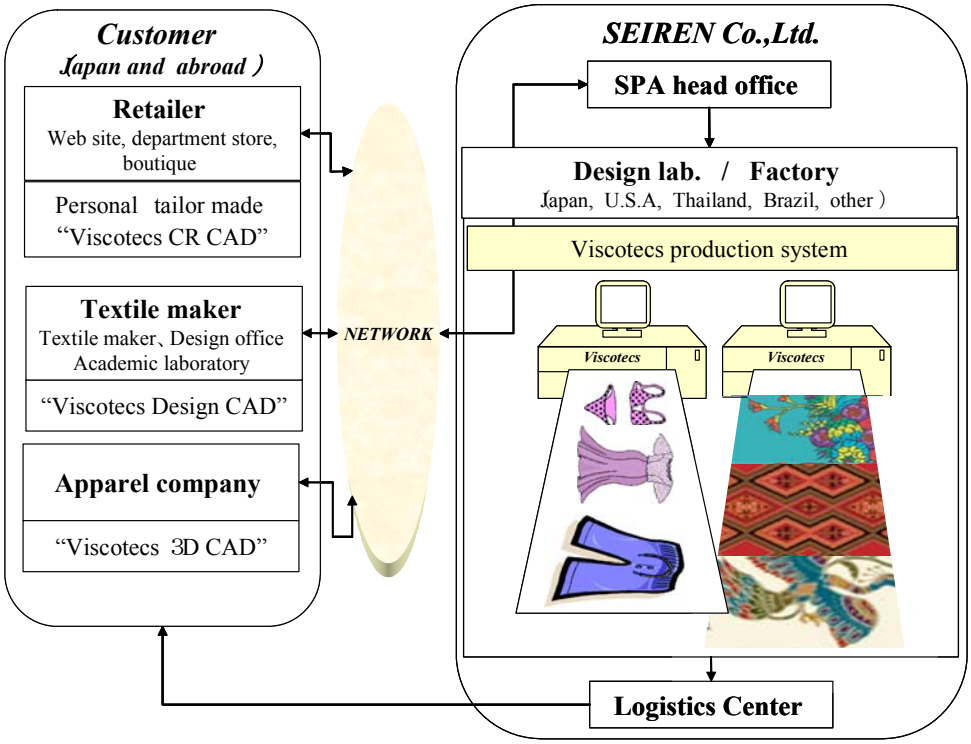
Kawada's dialogue for a streamlined color proof process was the catalyst for a new information system, latterly called "Viscotecs". At the next product development meeting in December 1987, after a demonstration by the engineering department, SEIREN decided to invest 20 billion yen, one-third of its then annual sales, in developing a new information system that would enable the production of fabrics using an axiom ink-jet printer while allowing a seamless consultative design process between the customer and the company.

New Strategic Information System: "*Viscotecs*"

SEIREN successfully developed "Viscotecs," an online real-time digital printing production system for fabrics. With Viscotecs SEIREN can manufacture a wide variety of products in small quantities, quick delivery, without stockless production. Viscotecs has been in operation since June 1989; in 1990 a dedicated factory was opened at the technical centre in Techno Port which lies between the cities of Fukui and Mikuni. The Viscotecs internally-developed system consists of two parts: a "3 D-CAD [Three-Dimensional Computer Aided Design] System" and a "Digital Dyeing System". This 3D-CAD System assumes the roles of designing and engineering, while the Digital Dyeing System uses an axiom ink-jet printer for the processes of dyeing, automated cutting and precision sewing.

SEIREN operates seven production bases worldwide as well those located in Japan and are all connected to a global online Intranet. The Viscotecs production system can be extended to deal with orders from the fashion industry, as well as the automotive industry (e.g., upholstery materials car seats) and interior accessories.

Figure 3 The Outline of the Viscotecs



Source: Described with reference to Internal information and Website by SEIREN Co., Ltd.

Traditional mechanical plate printing which makes form works based on a single color requires die matching before the emergence of the end design. Production lead time of conventional textile printing took between three and six months. In contrast, Viscotecs needs just five hours stretching up to two weeks during high-volume production[18]. With Viscotecs, the 3-D CAD captures a computer-generated design. Designers can adjust colors and patterns from their computers. Then the Digital Dyeing System dyes the design onto selected fabrics to give a finished precise product with no time lag before printing to paper using an ink-jet printer. The 3D-CAD system consists of three parts: for retailers with orders for store display, for design companies (e.g., textile makers, designers) and for apparel companies[19]. Next the Digital Dyeing System adds color to the design. Viscotecs has an expanded color capacity of up to 16.77 million colors without traditional form works. Viscotecs makes it possible to produce small lot sizes: from one meter for a single piece of clothing up to bigger orders of 2,000 meters per lot. This innovative information system allowed SEIREN to institute "direct to distributors" a new business model for the company.

Viscotecs is a special business system because it makes possible the ultimate in small-lot production, from a wide range of fiber type (i.e., cotton, rayon, wool, silk, nylon, polyester) and of materials (i.e., textile fabrics, knitting, asperity, bonded textile, lace, and artificial leather) as high-volume production[20]. Additionally Viscotecs also achieves a nonpolluting production line; with Viscotecs, energy usage is 1/5 ～ 1/10 and water usage is 1/20～1/30 of conventional systems[21].

The Origins of the Viscotecs

During the integrated systems of production, from the procurement of raw materials through processing and transformation to the finished product, Kawada introduced the concept of adding value and accumulated know-how derived from the company's conventional business practice of "Dyeing fabrication"(e.g. dye materials, synthesis of dye, improving technical efficiency)[22]. This concept can be seen in the origin and operation of Viscotecs. In fact, When developing Viscotecs, SEIREN conducted primarily and accumulated business know-how from five subsidiary companies, Seiren system service (e.g., computer software), Seiren electronics (e.g., hardware), Seiren chemical (e.g., materials of dye), Seiren KP (e.g., textile fabrics), Depro(printmaking))[23].

In the case of the advanced computer-based dyeing technologies, we will illustrate the development of the Digital Dyeing System. The main component is an axiom ink-jet printer, but there are significant differences between printing to paper and to fabric. As with printing to paper, the colors on fabrics must match the colors displayed on the computer. However as fabrics are three-dimensional, unlike paper, the dye ink will penetrate and spread, thus during dyeing (printing on fabrics) infiltration and diffusion must be controlled with sophistication because of the thickness of fabrics. (i.e., printing to two different thickness fabrics using the same colors, there is a possibility that the colors will look different when compared)[24].

In addition the penetration rate and diffusion rate are different for each fabric as is the temperature property of each. SEIREN has developed color management software related to its dyeing business process. Individual fabrics have different stretching properties and this differs between materials. To counteract this SEIREN developed its own dedicated hardware to control the original ink-jet printer together with software to control the hardware SEIREN used in its dyeing business process since 1967 when confronted with the "SK movement". This was intended to scientifically manage the dyeing business process, especially to improve the quality of dye reproducibility. As a result this IS forms a core part of the Digital Dyeing System. Other innovations at SEIREN included the introduction of the IBM1130 which was the most advanced computer at the time. SEIREN originally developed the COCOCO (Computer Color Control) system which went in to operation in 1971.COCOCO could match colors based on color science and calculate the dye prescription[25]. SEIREN also developed a colourway printing information system which could coordinate different color combinations. This was followed by an automated

color combination system. Thus the original IS, developed from SEIREN's accumulated knowledge, has been further enhanced through integrated insourcing resulting in continuous IS development which helped diversify and drive SEIREN's business.

RESULTS

Financial results

Beginning in 1982 in the midst of a structural depression in the textile market SEIREN recorded negative earnings. (i.e. the amount of sales was 32.4 billion yen, the current earnings minus 10 hundred million yen, and continued non dividend for 5 years from 1982 to 1987). However, in 1988 during Kawada's first year at the helm sales increased to 50 billion yen recording a profit of 15 million yen. From 1988 to 2008 SEIREN enjoyed a period of continued growth. In 2007 sales topped 112.9 billion yen, and profits rose to 7.3 billion yen. In the same year SEIREN's capital which was valued at 2 billion yen in 1987 was revised to 17.5 billion yen[26]. When the subprime loan shock occurred in 2008, sales dropped to 98.1 billion yen, and while SEIRE still recorded a profit, at 2.9 billion yen it was significantly less than the previous year. Sales to Japanese automobile companies had fallen, but business with the automotive industry outside Japan enabled SEIREN to keep its accounts balanced and in the black. We can therefore say that the strategy of diversification and extensibility worked effectively.

An examination of the composition ratio of sales reveals that the conventional dyeing manufacturing business accounted for 51% of sales in 1987. However with the advent of new IS technological innovations and breaking into new markets, SPA (Speciality-store/retailer of Private-label Apparel) and automotive upholstery materials (e.g., car seats), the traditional dye business accounted for only 9%[27] of sales in 2007. Therefore we can confirm that SEIREN's business transformation had evolved.

Results of the vision "direct to distributors" and globalization

SEIREN has built the Viscotecs business system to produce and merchandise an expansive product range without time-lag within the infrastructure of a high-speed communication network. To do so it has established a global presence with a design studio in Japan (head offices in Fukui and Tokyo, other offices throughout Japan), America (New York, California) and Asia (Thailand). SEIREN produces automotive upholstery material in a number of countries including Japan(Fukui), America(North Carolina), Asia(Thailand) and South America (Brazil) giving it a global design and manufacturing basis. Viscotecs EU was established in Italy (Milan) to tap into the global fashion market[28]. Under Viscotecs SEIREN has evolved from a supplier direct to distributors company to "direct to apparel" and "direct to retailers and consumers" company.

We will now discuss some specific cases. First let us examine SEIREN's innovations in apparel production by looking at its product development in swimwear. Swimwear is influenced by fashion tastes; consumer's tastes are notoriously unpredictable. Traditionally SEIREN produced its full swimwear product line before each sales season. However, with Viscotecs it only produces a sample of its lines before the sales season; additional stock is produced during the season in accordance with sales. As a result, for one product line, dead stock decreased from 27% to 5% while sales rose 150%[29] selling 32,000 units per 1 design (previously it sold between 600 and 1,000 pieces). [30] With the Viscotecs production system a wide variety of products can be produced in small quantities. Several countries including Japan have used the Viscotecs system to outfit athletes competing in swimming, skiing and skating events with high grade special textiles for sporting events such as the Olympics[31]. Similarly Viscotecs car seats can be also customized to each consumer's design demands. With Viscotecs SEIREN is a market leader in Japan. It is a testament to its innovation that SEIREN is entrusted with the all automotive companies in Japan and is expanding their business[32].

Improving the sustainability of competitive advantage by acquiring a business model patent

Viscotecs was granted a Japanese business model patent in 2000 (No.2939908), the first business model patent in the textile industry in Japan. The patent was granted for the integration of the business model and information system which allowed for customized fabric (e.g. clothes). Conventional techniques had two problems, namely procuring and working with multiple materials and complicated designs. First the number of colors and length of repeated designs were limited. Secondly it cost a great deal of money to produce many kinds of materials using complicated designs. Manufacturers had no system whereby they could produce a wide variety of products in small quantities, quick delivery and in a short lead time, thus they were required to adapt to the preconditions as outlined by material wholesalers.

In contrast Viscotecs could convert the precise three dimensional shape of the plane into digital data, print using an axiom ink-jet printer and automate cutting and sewing under the new IS; as a result of the new business system. Viscotecs allowed SEIREN to act quickly by removing design constraints, giving it far greater control over material design and color scheme[33].

Acquiring a business model patent was an official acknowledgment of SEIREN's technical innovation as well as giving it a competitive advantage through the proprietary rules laid down in patent laws.

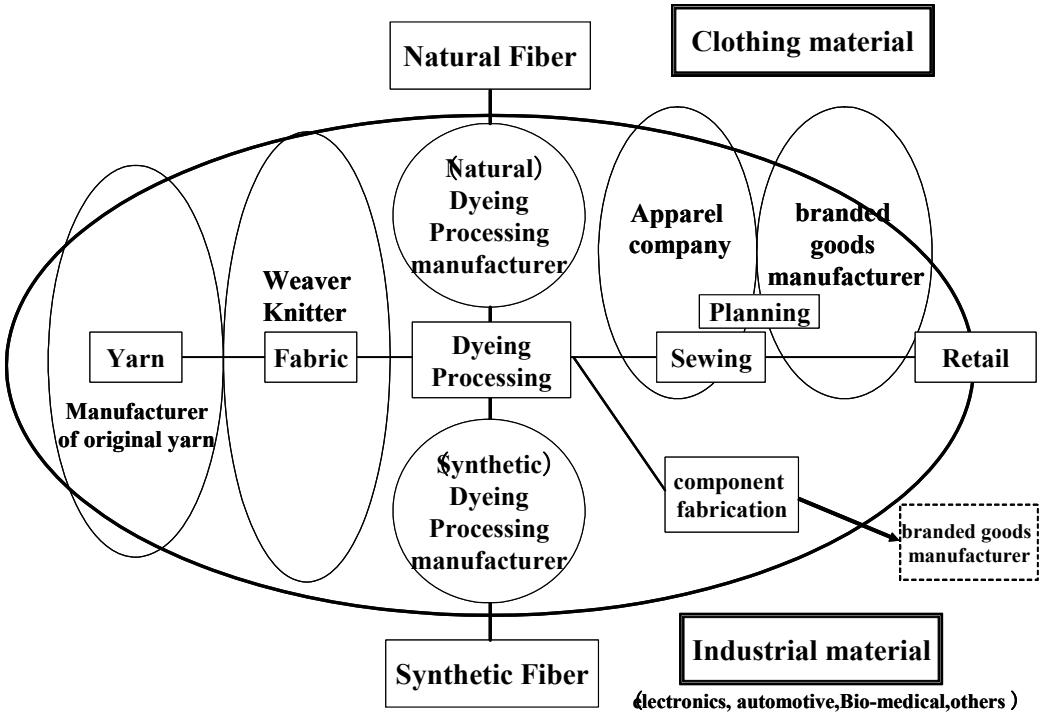
Strategic dissemination and exploit of Viscotecs

SEIREN established a fully integrated system (i.e., fabrication of original yarn, weaving, knitting, processing, cutting, and sewing) of SPA by Kanebo's fiber business transfer in 2005.

Presently SEIREN is continuing with its current business system (i.e. manufacturing of a wide variety of products in small quantities, quick delivery, and stockless production) while maintaining its tradition of diversification both to develop new business systems and create competitive advantages.

In *haute couture* or high fashion, SEIREN is creating a value-added design system using the "Viscomagic" system (e.g. fiber and textile processing for improving air permeability and elasticity). Meanwhile, yet another new business system called "Solid Viscotecs" is underway in the field of non-fibrous industrial material. For example, with it is dye processing (e.g. light resistant non fiber's materials which use pigment ink) on wall surface. SEIREN continues to build new production facilities, develop and use new IS based on the knowledge gained from Viscotecs[34]. Similarly, with glass, metal, wood and artificial leather SEIREN has horizontally developed a new business system using non-fiber materials.

Figure 4 The outline of strategic diversification



Source: Internal information by SEIREN Co., Ltd.

DISCUSSION

Through literature review and this exploratory case study, we consider a question in theoretical and managerial aspects

This case study demonstrates the process of the business system transformation and development of strategic IS. As a theoretical aspect, in terms of strategic resources and sourcing management, why and how effectively practiced business system transformation and the development of strategic IS.

The decision-making of "business systems transformation" with information system reform

Presently SEIREN's vision is "From textile industry to information industry", as a basic strategy (i.e. (1) non clothing, non-textile (2) IT and direct (to consumers) (3) Globalization) has been mentioned since 1987, the president Kawada is basically consistent[35]. To change large companies, it indicates that very long-term vision is important. In other words, having advanced vision to withstand long-term management is required.

However, even if the companies recognize the technology and customers trends, Companies are not always to be able to survive. Companies are required to build the competitive advantages and sustain them, however, it is practically difficult and necessary to make effort to keep and rebuild them. More specifically, president and management can make a goal as achieving the vision of change and extend competitive advantage at business systems transformation, and they need to continue to be strengthened in long term.

Taking consideration in technology trends and customer's needs, the president kawada took new vision to change the company as the information industry from the textile industry. As a way of its realization, the president Kawada regarded corporate IS as a strategic corporate asset. His decision is to develop corporate IS to be long-term the strength. This policy is considered to be based on trust in the company's long-time accumulated technologies and knowledge.

In this case study, the President Kawada's counter-proposal was about suggestions that improving the mechanism of printing and processing from technology sector, And at the same moment it made the concept of "Print production from design data". It could embody the new requirements of new IS, what is called "Viscotecs", development. We consider it was not result from an accident, but from the president Kawada's business insight from accumulated practices, experience, strong problem consciousness (e.g. Non-textile consciousness from Kawada's practical experience at factory and sales directly to customer, To deal with the automotive industry's, clearly different from the textile industry, just-in-time business systems, Vertical integration in the automotive interior business, Recognition of future IT developments, IT and direct (to consumers) as a basic strategy). In fact convinced of the feasibility of proposed improvement of the printing and production technology has been backed from the long-term

accumulation of research and development. With very strong conscious of reform, the new IS was spun "*Viscotecs*" as a creative moment(Ishii, 2009). Thus under harsh business environment, IS was a new practice management challenges as the development of large-scale investment, "Business System Transformation" was promoted.

Insourcing management of the IS throughout business transformation

The president Kawada cognize the source of added values which are each of business practices in depth. To capture the resource of added values of the company as its point of ingenuity, they turn off the rudder and full in-house integrated production. Thus the IS were developed basically insourcing (i.e. in-house), Not using versatile products and the introduction of so-called ERP package with IT outsourcing, they built its own IS except for computer equipment and operation system software. Insourcing was not only Viscotecs, SCM (Supply Chain Management System) which supports the Viscotecs and personnel system with objectives management, rectification management system called "Seiryu-Kanri System" to optimize production control system, carefully specification in the details of SEIREN's uniqueness has been built.

Carr (2003, 2004, 2005, 2008), as shown, including a so-called business applications to enterprise IT are considered as "commodity". Under the ERP and other IT products and outsourcing of IT have become increasingly general conditions, the company's insourcing IS development is considered to have certain suggestions.

As a practical case, SEIREN's insourcing strategy is widely distinguished from many companies which select outsourcing strategy (e.g. extensive outsourcing, capital alliance, selling out the IS department to IS service provider). SEIREN has accumulated technical and business expertise in-house over a lengthy period, thus technology and business know-how which are scattered in-house, but when SEIREN had an opportunity to change the business system throughout the development of IS, they aggregated the know-how and created their own added value to be converted.

This requirement is called the introduction of generic products (such as business process and parameter setting range) in the transfer of best practices and other independent of the uncertain constraints and effects of a new high but not limited thinking in IS development will be directed to the pursuit of an ideal based on accumulated know-how. And having its own path dependency and the extreme difficulty of modeling as shown to obtain business method patents have IS built, which can be connected to the sustainability of competitive advantage.

So, insourcing managements enabled SEIREN to shape the visions toward what it should be in the future based on accumulated know-how, without constraining its thinking by requirements of general-purpose system (such as scope of business process and parametric design) and dependence on other companies best practice whose effect is uncertain(Brown & Duguid, 2000; Szulanski, 1996).

As a result, having its own path dependency, SEIREN achieved sustainable competitive advantage by developing IS with very high difficulty of imitation as shown to obtain business method patents.

FINDINGS: THE SEEDS OF *"IS- EXTENSIBILITY"*

The case study focused on SEIREN at its business transformation process entailing renewal of its IS. There we can see the existence of accumulated seeds of IS extensibility that helped to make the prospect of change and contributed to sustainable improvement of the extra edge after the business transition.

In SEIREN, many seeds that evolve into Viscotecs in future had been produced before the change of businesses system: the dedicated hardware for ink-jet printing with precise adjustments to different kinds of stretch fabric material and software to control it, COCOCO-System that matches the colors based on color science and calculate adequate dyeing recipe for control the color scientifically and improve the quality of dyeing reproducibility, design by the 3D-CAD, Technology that approximate the colors on monitors to the dyed colors on fabrics, response to strict Just-In-Time business process that Japanese automobile industry requires and so on. Because SEIREN accumulated these seeds in the organization, recombination of them was possible.

In addition, even after starting operations of Viscotecs, the IS of SEIREN has been extended drastically. The added IS include printing system for high value-added fabrics, car seats, non-fiber materials (e.g. glass, metal and artificial leather) used for house wall for example and build-to-order system that enable consumer to customize design at the retailers.

MANAGERIAL IMPLICATIONS

When transformation of business systems, if a firm reform it's IS by introducing general-purpose system or outsourcing contrary to insourcing at SEIREN, the risk to lose the value of accumulated business know-how might be pointed out. Some people claim that general-purpose systems are beneficial to take in the best practices of other companies, however, whether the best practices of one company always can be applicable to the others or not is uncertain.

We would like to mention that in replacing existing business practices by a general-purpose system, it is difficult to assess its effectiveness from a long-term stand point, because there is need to consider the relationship with other resources that the company posses as well as efficiency. In other words, while there is an "opportunity" for company growth through the development of IS, it cannot be even recognized as long as you believe in IS outsourcing.

This exploratory case study shows clues of theoretical hypothesis that the effectiveness of developing IS in-house to acquire sustainable competitive advantages at business system transformation. Specifically it indicates that (1) the innovative vision of top management

advances accumulating business knowledge deeply and widely in organization, and (2) using accumulated knowledge and skills through insourcing management enables the firm to develop unique and effective IS.

One of the findings in our study exploring theoretical hypothesis is that *"IS-extensibility"* and accumulated capabilities enable business transition entailing reformation of IS to be achieved more flexibly. All these success in SEIREN are regarded as the result of continuous improvement of dyeing technology and accumulated know-how about business process through insourcing management. In the view of capability-based approach, we conclude that Insourcing (Not Outsourcing) IS development that includes "IS-extensibility" could make the business system transformation more flexible and effective.

SEIREN also promoted diversification as the extension of business system and developed IS, Viscomagic and Solid Viscotecs, which have the same concept as Viscotecs for non-textile sector. This fact reflects that new design concept rooted in the company through development process of Viscotecs has spread in the organization and promoted transformation of business process continuously. That is, IS constructed through business transformation help not only to realize business systems but to drive further change of the business systems.

LIMITATIONS AND AN AGENDA FOR FURTHER RESEARCH

We conducted the case study of SEIREN in order to find clues of theoretical hypothesis that answer the question how firms develop and maintain their IS that provide competitive advantages at business change. While we found theoretical and managerial implications, this is exploratory case study of one company under the specific conditions. So as to generalize these findings and development these implications, further case study and testing are essential. In particular, in order to control the difference in terms of conditions and to build a robust theory, comparison case study of other company in different kinds of information system and industry or other country is required.

In addition, "IS-extensibility" that is one of findings of this study is required to be conceptualized clearly. The relationship to existing concepts is needed to be clarified. And to organize the similarities and differences, comparative case study with the company that is outsourcing its IS management. Addressing these agenda must be an important step to make the findings contribute to IS management.

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ENDNOTES

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Mari Yoshida is Associate Professor, Business Administration, Ritsumeikan University, Ph.D. in Commercial Science of Kobe University

1 Shuichi, Kitagawa. Senior advisor of SEIREN Co., Ltd. since 2003. Joined a company (Fukui Seiren Kakou : current SEIREN) in 1960, Researcher (e.g. Dye processing) at research laboratory, Manager at Information System department, Factory manager (e.g. production management) at automotives , Administrator of the U.S. automotives factory, Director and administrator of “”only one development”” (i.e. Supporting the produced seeds by standpoint of Business management) and general manager of Information Planning Division, and president of Seiren System Service Co. since 1995, (current) Senior advisor since 2003.

2 Tatsuo, Kawada. President of SEIREN Co., Ltd since 1987. Joined a company (Fukui Seiren Kakou: current SEIREN) in 19662. Assigned at a Factory (5 years), chief of the sales department since 1979, Director and general manager of Product & Sales Department since 1989, Managing Director since 1985, (current) 6th President of SEIREN Co., Ltd since 1987.
After joined the company, he had hold prominent position of Sales Manager. He lead the development of automotive upholstery material (i.e. current main product of this company)and construction of integrated business process from planning to sales ,what is called, New business system “SEIREN-SPA ” in automotive business.

3 Kawada,T.; discourse, (1993). Henka ni dou taisyositeikuka [How adapt the changes]. *Nihon bouseki gekkan*, 553, 9.

4 The removing process of exposed sericin at the surface of silk which is twisted of original yarn. Before dyeing, refined to complete (i.e. "SEIREN" in Japanese) makes it possible to penetrate dye compound to yarn equally. For an example, refining, what is called "Seiren", has effect of coming intrinsic whiteness and glossy of silk.

5 IT & Management Gyoukai no jyoushiki wo uchiyaburi shayousangyou kara seichousangyou e tenkan [business transformation from depressed industry to growth industry, breaking down fixed thinking of the industry segments]. *NTT nishinihon MIX,* 2003, June, 14.

6 SEIREN hyakunenshi henshuuiinnkai (1990). *Seiren hyakunenshi*[100-year company history],SEIREN Co. ,Ltd, 593-597.
SEIREN keeps the key strategy “value creation company”

7 Kitagawa,S. (2001). Tahinshu・shouryou・tannnoukitaiou no kikaku・seizou・hanbai shisutemu isukottekusu shisutemu nitsuite [SPA system “Viscotecs” actualizing a wide variety of products in small quantities and quick delivery]. *Senshokukenkyuu*, 45(3), 65-68.

8 Interviewed with Shuichi Kitagawa Senior Adviser on October 26th, 2009.

9 SEIREN hyakunenshi henshuuiinnkai (1990). SEIREN *hyakunenshi*[100-year company history],SEIREN Co. ,Ltd, 593-596.

10 Described with reference to Interview with Shuichi Kitagawa Senior Adviser on October 26th, 2009.
And Nomura, M. (2007). ”SEIREN niokeru kigyoukakushin[business transition of SEIREN],”*Sennigakkaishi(Senni to Kougyou),*63(3), 74-75.

11 Nomura, M. (2007). ”SEIREN niokeru kigyoukakushin[business transition of SEIREN],”*Sennigakkaishi(Senni to Kougyou),*63(3), 74-75.

12 Interviewed with Shuichi Kitagawa Senior Adviser on October 26th, 2009.

13 Interviewed with Shuichi Kitagawa Senior Adviser on October 26th, 2009.
At that time, it was not even recognized occasionally which end-products were delivered to the customers after dyeing processing。

14 Interviewed with Shuichi Kitagawa Senior Adviser on October 26th, 2009.

In the case of conventional plate printing, it cost 30-50 thousand yen (i.e. it cost 300-500 thousand yen for 10 colors plates) ,thus if it cost 300-500 per 1 meter fabrics as one lot with dyeing processing, it was impossible to become profitable.

15 Interviewed with Shuichi Kitagawa Senior Adviser on October 26th, 2009.

16 Interviewed with Shuichi Kitagawa Senior Adviser on October 26th, 2009.

17 Interviewed with Shuichi Kitagawa Senior Adviser on October 26th, 2009.

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21 Kitagawa, S. (2001). Tahinshu・shouryou・tannnoukitaiou no kikaku・seizou・hanbai shisutemu isukottekusu shisutemu nitsuite [SPA system "Viscotecs" actualizing a wide variety of products in small quantities and quick delivery]. *Senshokukenkyuu*, 45(3), 65-68.

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