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Foreign Parent Strategies, Control

and International Joint Venture Performance

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Abstract

This paper develops and expands upon an important connection between foreign parent firm strategies, the manner in which they control their international joint ventures (IJVs), and the performance of those IJVs. Parent firms' strategies refer to strategic motives, importance, focus, and competitiveness. Foreign parent firm control is conceptualized across three dimensions including the control mechanism, the control focus, and the extent of control. Our empirical evidence is based on the survey data collected from Finnish firms that established IJVs with local firms in the 1990s. The empirical evidence show different strategies used in IJVs by foreign parent firms required different control structures in IJVs. In addition, the firms that adapted control structure in their IJVs according to their strategies were more satisfied with their IJV performance than those who did not. As such, the paper takes a step further from just being concerned about parent firms' strategies and moves our thinking toward understanding how to realize such strategies through proper control.

Keywords: Strategy, Control, International Joint Venture, Performance

1. Introduction

In the last decades, establishment of IJVs has become a major strategy for firms entering international markets (Ding, 1997; Duan, 2007; Dunning, 1995; Li, 2003; Meschi & Riccio, 2008), and an important strategic approach for coping with global competitive pressure (Kwon, 2008). However, researchers have pointed out that between 30% and 70% of the total number of IJV established eventually break up (Hennart, Kim & Zeng, 1998; Yeheskel, Newburry & Zeira, 2004). The literature of international business shows that control is one of the biggest challenges that parent firms face when entering IJVs (Geringer & Hebert, 1991), and plays an important role in IJV successes, or failures (i.e. Groot & Merchant, 2000). Already more than 15 years ago, Geringer and Hebert (1989) proposed that future research should broaden the critical considerations and implications of control in terms of mechanisms, control extent, and control focus. Later on, Raswamy, Gomes, and Veliyath (1998) have also suggested the necessity to examine a wider array of IJV control through in-dept investigations. More recently Barden, Steensma, and Lyles (2005) have added to the debate and suggested that further research is needed to investigate the "fit" between parent firms' strategies and their control systems.

The purpose of the present study is to analyze the relationships between foreign parent strategies, control and performance in IJVs. The research puzzle is addressed through the following questions:

1) How do foreign parent firms configure the control structure in their IJVs to implement their strategies?

2) What are the relationships between foreign parent control structure in IJVs and the IJV performance?

In the present study, an IJV is regarded as a separate entity formed by a multinational company (MNC) or multinational companies and a local firm or local firms either through greenfield investment or partial acquisitions. In the following sections, we conceptualize the IJV control along three dimensions including mechanism, focus, and extent. Then, we develop hypotheses regarding foreign parent strategies, IJV control and performance. We conclude by pointing out the implications for researchers and managers, and indicate some opportunities for future research.

2. Conceptualization of IJV control

In the organizational literature, management control means the process by which an organization influences its members and units to work in ways that meet the organizational objectives (Glaister & Buckley, 1998). According to Child et al. (2005: 15), control is a central aspect of management, and essential in any system that holds managers accountable for their actions and decisions. The main purpose of control is to attain predictability and critical information on IJV operation through some regulatory means (Makhija & Ganesh, 1997), and thus to safeguard the parent firm's interests. In the present study, the control of IJVs is defined as the influence of the foreign parent firms on the operations of the IJVs (Ding, 1997). Furthermore, researchers have acknowledged that control systems are complex and multidimension (see e.g Das & Teng, 1998; Geringer & Hebert, 1989; Lu & Hebert, 2005). Unfortunately, existing research tends to focus on only one dimension. To be able to capture the dynamic nature of IJV and conduct IJV control research thoroughly, this study adopts the multidimensional approach of control (mechanism, focus, and extent) advocated by Geringer and Hebert's (1989). In this section, these control dimensions are elaborated upon.

2.1 Control mechanisms

Control mechanisms are structural arrangements deployed to determine and influence what an organization's members do (Geringer & Hebert, 1989). Control mechanisms consist of a variety of mechanisms including formal and social controls that are available for firms exercising effective control to protect their interests in IJVs (Geringer &Hebert, 1989; Groot & Merchant, 2000). *Formal control* depends on hierarchies, standards, codified rules, procedures, goals, and regulations that specify desirable *patterns of behavior* (Das & Teng, 1998) aimed directly at protecting the assets of parent firms (Fryxell et al., 2002). Formal control mechanisms help to decrease the potential for opportunisms by controlling the assets through hierarchical means (Mjoen & Tallman, 1997). *Social control* is designed to promote expectations and mutual commitments through which the IJV managers learn to share the common attitudes and knowledge of the parent organization. Social control refers to mechanisms such as personal relations, informal communication, information exchange and training, mentoring, and development of a common organizational culture that foster shared values and norms without explicitly restricting the behavior of the targeted people by those social controls (Schaan, 1983; Das & Teng, 1998; Fryxell et al., 2002).

2.2 Control focus

Regarding the control focus, partners can choose to have a *broad control* focus and attempt to exercise control over the entire range of the IJV's activity, or they can have a *narrow control* that focuses on only one or two areas in IJV activities which they consider the most critical (Geringer & Hebert, 1989; Groot & Merchant, 2000). The most critical areas in IJVs are often: 1) Marketing, sales, and distribution; 2) Procurement; 3) General management and operation; 4) Finance and accounting; 5) R & D; 6) Production and quality; and 7) Human resources (Glaister et al., 2005). Depending on factors such as the parent firm's competencies and the goals of IJV activities, parent firms may focus their control on technology-related or market related activities (Child et al., 2005).

2.3 Control extent

Control extent refers to the tightness of control which is exercised (Geringer & Hebert, 1989). Tightly controlled organizations tend to be strict with respect to their employee's punctuality, and detail oriented, and precise in operation. Tight control can be effected through any mechanism that provides a partner with a high degree of certainty that personnel in the IJV will act as the given partner wishes. According to Child et al. (2005), the tightness of control is reflected in frequent and precise reporting. Controls can be tightened by more intensive training of IJV employees in production and management techniques.   These dimensions of IJV control will be used as the IJV control structure when we discuss how foreign parent firms strategies determine the IJV control structure in the following section.

3. Foreign parent strategies and IJV control

Gaining management control over an IJV is one way to ensure that one's strategic objectives are actively pursued, and to actively monitor and curb possible opportunism by one's partner. Johnston (2005) argued that different subsidiary tasks are associated with different levels of parent control. Previous researchers proposed that foreign parent firms entering into IJVs should design their IJV control structure based on their strategic motives, strategic importance (Chalos & O'Connor, 1998), strategic focus (Li, 2003), and competitive strategy (Govindarajan & Fisher, 1990).

However, the existing research does not show any links between the partner's strategies and the choice of the IJV's control system (Groot & Merchant, 2000: 583; Barden et. al, 2005). This section, therefore, attempts to fill in this gap.

3.1 Strategic motives

Previous researchers suggested that the strategic motives of parent firms determine their control in IJVs (e.g. Calantone & Zhao, 2001). Foreign parent firms enter into joint ventures with different motives. According to Harrigan (1985), foreign parent firms form IJVs to generate internal benefits, competitive benefits, and strategic benefits. Kogut (1988) suggests three main motives for IJV formation including cost reduction, strategic behavior, and learning. To find a link between parent strategies and their control within the scope of this paper, we adopt the classification of motives proposed by Makino (1995): 1) accessing the partners' proprietary resources, and 2) achieving economies of scale and scope.

The primary motive for foreign parent firms forming IJV is to *gain access* to a local firm's proprietary resources including both firm-specific knowledge and country specific knowledge. Whilst, local firms may lack management know-how and technology (Luo et al., 2001), they often contribute their country specific knowledge, land, and manufacturing facilities (Killing, 1983). According to resource dependency theory, if the access that local parent firms contributing to the IJVs have is critical to the IJVs success, the local parent firms have a better position from which to negotiate for more control over IJVs (Mjoen & Tallman, 1997). Thus, they leave foreign firms less control in the IJVs. Foreign firms, as a result, acquire their control through social control and by concentrating their control on the areas where they contribute most to the IJVs.   Therefore, we expect that:

Hypothesis 1a: Foreign parent firms entering into an IJV to gain access to local parent firm proprietary resources are more likely to use a narrow, social, and loose form of control over the IJV.

Another common motive for a foreign parent firm to enter IJVs with local firms is to *gain economies of scale and scope.* For this purpose, foreign parent firms are often manufacturing firms and they just expect the local parent firms to merely supply them with cheap labor, and existing facilities such as land and/or a factory (Killing, 1983). This contribution by local parent firms can simply help to reduce the production costs of the IJVs (Kogut, 1988). For foreign parent firms entering into IJVs with this motive, the most important issue is the quality of the product of the IJV (Chalos & O'Connor, 1998). In addition, the success of a joint venture depends on the fit between the parent criteria for success and how well the parent control specific activities related to its criteria for success (Schaan, 1983). Thus, foreign parent firms may narrow down their control to focus on the quality issue of the IJVs' output. Furthermore, by focusing their control on some specific activities and loosening control over the rest of the IJV activities for local parent firms, foreign parent firms give incentives for local parent firms more chance to involve in and contribute to the activities of the IJVs. Giving up overall control and maintaining formal control in just some key areas of the IJV also helps to reduce the costs associated with excessive control. This may help to reduce the level of conflict and increase the cooperation between foreign and local parent firms. As a result, we propose:

Hypothesis 1b: Foreign parent firms entering to IJVs with local firms to gain economies of scale and scope are likely to exercise narrow, formal, and loose control over IJVs.

3.2 Strategic importance

An IJV can play an important role in the parent's value chain when it is a vital source for the parent firm's output, or a repository for the parent firm's core competencies (Johanson et al., 2001). Therefore, IJVs may be established to improve the strategic positioning of the foreign parent firms (Glaister & Buckley, 1996). With respect to the strategic importance, researchers (Bartlett & Ghoshal, 1986; Koza & Lewin, 1998) have previously argued that IJV parents do not often deem the partnership to be of equal important in their overall strategic portfolio, and that a partner that has a large strategic interest in an IJV may indeed prefer a broad control. According to Yan and Gray (2001), those firms for which the IJVs are of greater strategic importance than for their partners will have a greater stake in the venture and may negotiate strongly for control. Green and Welsh (1988) pointed out that when the IJVs play a key role in the parent firm's revenue or their inputs supplying, the parent firms will try to maintain such inputs and revenue under their tight control. In the same vein, Hennart (1988) suggested that the parent firms will seek for dominant control over the IJVs or convert these into wholly owned subsidiaries when the IJVs become strategically important to them.

Merchant and Groot (2000) found that when the foreign parent firms had a broader set of objectives for an IJV, their focus on control was broad. In contrast, they also argued that when firms use an IJV to diversify their offerings, they tend to employ a relatively loose control. Boyacigiller's study (1990) found that the greater the interdependence between the IJV and the headquarters, the more U.S. nationals were placed in the high-level positions in the subsidiary to manage the uncertainties. In summary*,* as suggested by the transaction cost theory, if an IJV is strategically important, the foreign parent firm will protect its position and reduce uncertainty to safeguard its interests. Thus, we propose:

Hypothesis 2: The more important the IJVs are to the foreign parent firms, the more likely the foreign parent firms are to exercise broad, formal, and tight control over them.

3.3 Strategic focus

3.3.1 Domestic focus

Domestic market oriented IJVs are those that direct most of their activities towards the markets (Chalos & O'Connor, 1998) where the IJVs are located, thus commitment and cooperation from the local partners are more important. Because foreign parent firms are probably not familiar with local tastes and local unique customer needs. The knowledge of the host environment provided by the local partners may enable suitable adaptation; and bring advantages to the IJVs (Johnston, 2005). Previous research also points out that less control from the foreign parent firms, and more influence of the local parents, are factors necessary for better performance of IJVs (Li, 2003). This is especially important in those countries such as China where the local governments play an important role in joint venture activities (Beamish, 1993). Information about the local economy, politics, culture and business customs, consumer's demands and tastes, the labor force, infrastructure, raw materials, and other factors required for the operation of joint ventures are likely to be delegated to the local partner (Makino & Delios, 1996).

In addition, Bai, Tao, and Wu (2003) found that if the sales of the IJVs' products are mainly focused on local markets, the control of the foreign parent firms decreases with the need for local marketing knowledge of their products. This is because the IJVs in the countries like China are often a marriage of foreign technologies and local markets. In this context, the marketing expertise for local markets is often an important contribution of the local partners, while the technological sophistication is an equivalent provided by the foreign partners. Therefore, the foreign parents oriented towards the local markets are likely to exercise less control over the IJVs because the resources important to them are obtained with the help of the local partners (Calantone & Zhao, 2001). As a result, we propose:

Hypothesis 3a: In domestic oriented IJVs, foreign parent firms prefer to exercise a narrow, loose, and social control over the IJVs.

3.3.2 Export focus

In some cases the sales of the IJVs are export oriented and the local parent partners often lack competence in exporting, thus it is more efficient for the foreign parent firms to dominate the IJV operation (Li, 2003). This may be because, as in case of managers in the countries of Central and Eastern Europe   there is technical proficiency but a lack of experience of market-oriented management functions such as strategic planning, and especially the marketing mix (Filatotchev et al., 1996; Stephan, 2006) which play a critical role in exporting to foreign markets. Thus, to offset the risk of the lack of local managerial competence of local managers, the foreign parent firms may become directly involved in a broad range of the IJV's activities.

In addition to exporting to international markets, the foreign parent firms who often have a competitive advantage in production management (see Liker et al., 1999) have to apply tight and formal control especially over product quality, so that their products meet the international standards and are able to compete in the international markets (Chalos & O'Connor, 1998; Li, 2003). Furthermore, export orientated subsidiaries often face risks related to security and enforcement of contractual export obligations such as timely deliveries and quality standards. Thus we expect:

Hypothesis 3b: In export oriented IJVs, the foreign parent firms prefer to exercise a broad, tight, and formal control over the IJVs

3.4 Competitive strategy

The competitive strategy used in the present study to investigate the dimensions of foreign parent firms' control dimensions over their IJVs in accordance with their competitive strategies, is based on the framework by Porter (1980). He divides competitive strategies into two main forms: 1) the low cost strategy, and 2) the differentiated strategy.

3.4.1 Low cost strategy

Many times, the foreign firms operating in foreign markets often have to adapt their strategies to align with the local consumer's income and therefore, often use a low cost strategy. This competitive strategy is characterized by: 1) vigorously pursuing cost reduction, 2) enforcing all the possible economies of scale, 3) acquiring process engineering skills, or skills needed in order to design and plan efficiently, 4) bring routine to the task environment, and 5) producing a standard, undifferentiated product (Porter, 1980). The main focus of this strategy is on the standard product with the routine task environment or in other words, cost control focus. The foreign parent firms motivate their delegates in the IJVs to measure these costs. Because the outcome is observable under the low cost strategy, the foreign parent firms will try to avoid costs by not engaging in further control, such as social control. Child et al. (2005) suggested that in the case of activities with a measurable output, control can be exercised through formal monitoring systems. Because control incurs both direct and indirect costs (Child, Yan & Lu, 1997), the foreign parent firms, which apply a low cost strategy for their units, gain a higher effectiveness by narrowing down their focus to some of formal control like output control (Govindarajan & Fisher, 1990). In summary we suggest:

Hypothesis 4a: The foreign parent firms prefer to exercise a narrow, formal, and loose control over low-cost strategy oriented IJVs.

3.4.2 The differentiation strategy

Foreign parent firms which adopt this strategy for their IJVs will target producing a unique product. Thus, the IJV should have a unique task of producing and marketing. In this kind of competitive strategy, knowledge management may not be a simple task for foreign parent firms with different subsidiaries. Differentiated products are often the result of a complex interplay between all the parts of the MNCs, thus parent firms may need to act as foci for tapping the resources of the total network (Birkinshaw & Hood, 2000). As a result, a close relationship between parent firms and the IJVs is necessary (Johnston, 2005). Miller (1988) maintains that the task environment of the units which adopted a differentiation strategy is more complex than that those adopting a low cost strategy. To cope with this, the foreign parent firms need to engage more in the IJV operation and thus to impose a broader control on them. Govindarajan and Fisher (1990) suggested that the units which are to manufacture unique and high quality products may gain a higher effectiveness when the parent foreign firms exercise more control over behavior which may be formatted by formal control. In a similar manner, Child et al. (2005) argued that, when IJVs focus on complicated marketing work, the most appropriate option is formal control which is based on behavioral assessments of how the activities are being carried out. Based on the above we expect that:

Hypothesis 4b: Foreign parent firms prefer to exercise a broad, formal, and tight control over the differentiation strategy oriented IJVs.

3.5 Links between the foreign parent firms' strategies, control, and IJV performance

Child and Yan (2003) argued that parent firm control permits the effective use of whatever strategic resources that the parent firms have in the IJVs. O'Donnell (2000) proposes that the fit between subsidiary strategy and the subsidiary control mechanism, such as incentives for subsidiary managers, can help the subsidiary achieve performance objectives. Johnston (2005) studies the relationship between headquarters and subsidiaries, and finds that different subsidiary tasks were associated with different levels of subsidiary autonomy. In other words, as parent firms set different tasks and targets for their subsidiaries they may exercise different levels of control over them. Dymsza (2002) analyzed the successes and failures of IJVs in the developing countries. He pointed out that parent firms which have a marketing oriented strategy emphasizing the product differentiation, segmentation of markets, trademarks and brand names, and promotion and selling will strive to control these activities in the IJVs. Lorange et al. (1986) maintain that through exercising a proper IJV control structure, foreign parent firms can make sure that their strategies are effectively implemented, and their resources are efficiently utilized for enhancing the IJV performance. Thus, we expect that:

Hypothesis 5: The foreign parent firms which adapt their control structures in the IJVs according to their strategies will enjoy a better IJV performance than those that do not.

4. Sample description and measurement

The study here is a part of an on-going research project focusing on IJV behavior, strategies, partner selection, control structure, and performance of Finnish firms. The target firms and investments were identified as follows: 1) The FDI data base collected by the project leader starting from the late 1980s based on press releases regarding IJVs published in several Finnish business magazines and newspapers, 2) Annual reports and websites of the 250 largest Finnish firms as reported by the leading business magazines, 3) based on the earlier surveys focusing on IJVs and wholly owned subsidiaries of Finnish firms conducted by the project leader. From the resources, we identified 340 IJVs qualifying IJVs formed by Finnish firms since 1985 and in operations at least until 2002. The qualifying 340 IJVs involved 250 Finnish parent firms. Of those 250 firms, several firms were very difficult to contact either because they had been restructured or gone out of business. The aim of contacting the firms was primarily to identify the best informants. In some firms there was no longer anyone employed with sufficient knowledge required to inform. This left a total of 200 Finnish parent firms. Due to time and cost constraints a postal questionnaire and online web survey were used to gather the data.

The participants were those managers who directly involved in the establishment and operations of the IJVs. To enhance the quality of the data, the respondents were contacted by phone in December 2006 to explain the key points of the study and the questionnaires. In exchange for their cooperation with the study and to provide motivation and accurate responses, the respondents were assured of anonymity and were promised a summary report of the findings and also participated in a draw for three gifts. After one reminder at the end of the January 2007, at the end of February, 54 questionnaires were collected from 49 participating firms giving responses relating to 54 IJVs, a response rate of 24,5 % which is relatively similar to that of earlier respective studies in Finland (see Larimo & Rumpunen, 2006). The sample was carefully examined for any systematic response bias using t-tests. Respondents and non-respondents were compared across their age, size, international experience, and IJV experience. No statistically significant difference was

found. Thus, there was not response bias to be found in the final sample. After taking out the uncompleted questionnaires, the final sample related to 49 IJVs.

Among these IJVs, 45% were established in 1988-1995, and 55% in 1996-2006; 53 % through acquisitions, and 47% through greenfield investment; 76 % involved 2 partners and 24 % involved 3 partners; 61% were established with indefinite duration, 22% with a duration of less than 5 years, and 17 % stated to have a duration of more than 5 years; 41 % had a degree of Finnish ownership of between 10%-49%, 10% had equal ownership, and 49 % had Finnish majority ownership at establishment; 71% were located in emerging economies, and 29% in developed economies; 63% dealt with industrial products, 27 % with consumer products, and 10 % offered both consumer and industrial products.

All three control dimensions were measured with a 5 point-scale. Based on the list of different mechanisms and focus areas provided, the respondents were asked to assess their 1) method of monitoring and control, and 2) their focus of monitoring and control (Cronbach's Alpha=0.92). The measurement of strategies used by parent firms in IJVs was based on a 5 point-scale with 1= "not important at all" to 5= "very important" where Cronbach's Alpha = 0.95. The measure of IJV performance was also based on a 5 point-scale, the respondents were asked if they were satisfied with IJV performance on both financial and total performance scales with 1= "very unsatisfied" to 5= "very satisfied" where Cronbach's Alpha = 0.94.

5. Results

The empirical data has been analyzed based both on descriptive statistics and on testing statistics. In order to test hypothesis 1 to 4, a correlation matrix including parent strategies and different control structures has been computed. The results are shown in table 1.

5.1 Parent strategic motive and IJV control

Of 49 respondents, 18 mentioned their main strategic motive in entering to IJVs to be gaining access to local firms, and especially their management skill set. Of these 18 respondents, almost 90% exercised narrow control, over 80% exercised loose control, and almost 80% exercised social control over their IJVs. In addition, table 1 shows statistically positive correlations between this gaining access strategy and narrow, social, and loose control structures. Thus, the result supports the hypothesis 1a: when foreign parent firms enter into IJVs to access local firms' resources, they prefer more social, narrow, and loose control over their IJVs. There were 31 firms who mentioned their main motive of entering IJVs to be to gain economies of scale. Of these 31 firms, more than 80% of foreign parent firms used formal control, and about 70 % of parent firms used narrow and loose control with their IJVs. Table 1 also shows statistically positive correlations between a strategy directed towards gaining economies of scale and scope and narrow, formal, and loose control structures. Thus, the result supports hypothesis 1b: foreign parent firms prefer formal, narrow, and loose control when they enter IJVs to gain economies of scale and scope.

5.2 Strategic importance of IJVs and IJV control

When asked to consider the strategic importance of their IJVs, 32 respondents mentioned that IJVs are strategically very important for the parent firms. Of these 32 responses, almost 85% of the companies concerned exercised formal control, and about 75% were found to exercise broad and tight control over their IJVs. In addition, table 1 shows statistically positive correlations between strategic importance and broad, formal, and tight control structures. Thus the result supports hypothesis 2 that the more important the IJVs are to the parent firms, the more likely it is that the foreign parent firms exercise more formal, broad and tight control over their IJVs.

5.3 Parent firm strategic focus and IJV control

There were 26 respondents who mentioned that the strategic focus in their IJVs was on exporting to other markets, and 23 respondents mentioned their focus on the domestic markets. Within the group of 26 respondents focused on export, 17 respondent firms (65%) exercised broad control over their IJVs and 21 (80%) respondent exercised tight control over their IJVs, and further 22 (85%) of foreign firms exercised formal control. Table 1 shows statistically positive correlations between export focus strategy and a broad, formal, and tight control structure. Thus, the result supports hypothesis 3b that IJVs with an export focused strategy, foreign parent firms prefer to exercise broad, tight and formal control over their IJVs. There were 23 respondents who described their strategies as being domestically focused. Among these, 19 (82%) exercised formal control, 8 (35%) employed narrow control, and 10 (43%) used loose control in their IJVs. Table 1 does not show any statistically significant relationship between domestic focus strategy and narrow, social, and loose control. Thus the result does not support hypothesis 3a.

5.4 Parent firm strategic competitiveness and IJV control

Twenty-one respondents mentioned that they implemented a low cost strategy, and 28 respondents mentioned that they applied a differentiation strategy in their IJVs. Among the 21 respondents with a low cost strategy, over 80 % exercised formal, narrow, and loose control over their IJVs. Table 1 shows statistically positive correlations between low cost strategy and formal, narrow, and loose control structures. Thus, the result supports hypothesis 4a that foreign parent

firms prefer to exercise formal, narrow, and loose control over low cost oriented IJVs. Among the 28 respondents who employed a product differentiation strategy more than 80% exercised broad control and formal control, and over 75% respondents applied tight control to their IJVs. In addition, Table 1 shows statistically positive correlations between the differentiation strategy approach and broad, formal, and tight control. This result supports hypothesis 4b that foreign parent firms prefer to exercise broad, formal, and tight control over their differentiation strategy IJVs.

Table 1 about here

5.5 Parent firm's strategies, control, and IJV performance

There were 22 respondents who answered that their firms have adapted their control techniques according to their strategies. These 22 firms had a mean of total performance rating of 4.1 and financial performance rating of 3.7 (1= "very unsatisfied" to 5= "very satisfied") which indicates a positive relationship between parent firm's adaptation of control systems to their strategies and IJV performance. The remaining 27 firms which did not adapt their control systems to their strategies had a mean result of 2.6 for total performance and 2.5 for financial performance.

In addition, to testing hypothesis 5 statistically, a chi-square test was used. The purpose of the method is to determine how well an observed set of data fits an expected set of hypotheses. The method was used to examine the differences with categorical variables and the relationships between internal factors (e.g. parent strategies) and IJV control structures, and IJV performance. The results of the chi-square test show a strong positive relationship between parent firm's strategic choices, their control structure, and IJV performance (see table 2). Therefore, the results support the hypothesis 5 that supposed that the foreign parent firms which adapt their control structures in the IJVs according to their strategies will have a better IJV performance level than those that do not. It is worth noting that the results support hypothesis 5 based on both performance measures - total performance and financial performance.

Table 2 about here

6. Implications

Our empirical evidence shows that different strategies used in IJVs by foreign parent firms required different control structures. In addition, the firms that adapted the control structure employed in their IJVs according to their strategies were more satisfied with their IJV performance than those who did not. The present study contributes to the existing IJV knowledge by offering a link between parent firm strategy and control. To expand on that, most foreign parent firms want a high level of control that is consistent with their bargaining power (Calantone et al., 2001). However, the present study suggests that, to succeed in target markets, foreign parent firms must have a comparable IJV control structure that fits their strategies. This finding is consistent with Lynch (1993) and Kumar and Seth (1998) who argued that the IJV control structure reflects the parent firm's strategy. Moreover, the newness of this study is the extension of previous research. Although previous research (e.g. Kumar & Seth, 1998; Lynch, 1993) suggested the importance of a compatibility between strategy and control, it failed to point out which control structures are needed for which strategies. This study extends the previous research by specifying which kind of control structure would fit with different strategies. More specifically, for the purpose of gaining economies of scale and scope when committing a joint venture with local firms, the present study suggests that the foreign parent firms should focus their control on the most critical issues in IJVs, such as product quality control. Beside these critical areas, the foreign parent firms can allow the local firms to be in charge of other areas in the IJVs, thus they can reduce the costs associated with an excessive control structure, and at the same time, motivate the local parent firms to utilize their expertise. The foreign parent firms often use the IJV as a base for manufacturing units and then *export* the output to other markets. The present study points out that it is more efficient for the foreign parent firms to dominate the IJV operation. This is because managers in some countries, for example in Central and Eastern Europe, are often technically proficient, but inexperienced with market oriented management functions, such as strategic planning and the marketing mix which are fundamental to successfully exporting to developed markets. Thus, the present study suggests that broad and tight control help the foreign parent firms not only to ensure the IJV's output meets the international quality standards, but also to utilize their advanced management know-how of export best practice.

For the IJVs that are *strategically important* to the foreign parent firms, broad, formal, and tight controls are likely to be the effective ones. This finding confirms Johnston's (2005) work maintaining that when the subsidiaries are big and play an important role, the parent firms impose progressively more hierarchical, or formal control mechanisms, on their subsidiaries. Regarding the *competitive strategy*, for the IJVs which contribute to a low cost strategy, the parent firms tend to use narrow, formal, and loose control methods in their IJVs. However, when the foreign firms adapt differentiation as the competitive strategy for their IJVs, broad, formal, and tight controls may be the most effective to manage the IJVs. Differentiated products are the result of a complex interplay between all the parts of the firm, so that the foreign parent firms need to act as a center for tapping the resources of the total network. As a result, intensive control is deemed necessary. Social control mechanisms can not be used in both strategies because the structure will take longer to build, and be extremely costly (considering social events, such as outdoor activities, parties, extensive

training, building personal relationships, etc.). This finding extends the previous research by Gullander (1976), who suggested that an appropriate control structure allows parent firms to integrate the IJV's activities with its strategies. To expand on that suggestion, this study has specified which kinds of IJV control design structures are most suitable for different strategies. From another perspective, the findings contribute to existing knowledge by countering Johnston's argument that when the subsidiaries pursue a cost leadership strategy, the headquarters maintain tight control over subsidiaries' activities (Johnston, 2005: 36).

Figure 1 about here

7. Suggestions for further research

The present study offers several opportunities for further studies. IJV structure is the result of a negotiation process between foreign and local firms (Kogut, 1988). Because this study excluded the negotiation between foreign firms and local firms for control of the IJVs, further study could investigate the influence of this element on IJV control. In addition, there are other variables that can affect IJV control, such as operating environments (Fey & Beamish, 2000), cultural similarity (Lin & Germain, 1998). These factors also need to be investigated. Since the data collected in the present study is limited to IJVs formed by Finnish firms, further empirical study using the framework of this study could also collect data from different countries in Asia, Europe, and America. Then, the findings would need to be compared in order to provide more generalizable results. Moreover, as the IJVs evolve over time, further study using the presented framework in order to investigate the fit between the foreign parent's strategies and the control structures utilized during the life cycle of the IJVs may be of great interest.

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Table 1. Descriptive statistics and correlations

Variable		mean	SD	1	2	3	4	5	6	7	8	9	10
1.	Obtaining local access strategy	4.3	1.05	-									
2.	Gaining economics of scale, scope strategy	3.5	0.96	.19	-								
3.	Strategic importance	3.2	0.92	.15	.06	-							
4.	Domestic market focus strategy	3.0	0.92	.13	.23	.21	-						
5.	Export focus strategy	3.6	0.95	.11	.20	.25	.01	-					
6.	Low cost strategy	3.2	0.94	.24	.27	.09	.25	.09	-				
7.	Differentiation strategy	2.5	0.84	.21	.05	.17	.13	.04	.03	-			
8.	Control structure 1(B,F,T)	3.9	0.93	.21	.09	.49**	.15	.58**	.23	.47***	-		
9.	Control structure 2 (N,S,L)	3.1	0.92	.64**	.55	.12	.21	.08	.42	.13	.04	-	
10.	Control structure 3 (N, F, L)	2.2	0.95	.15	.46**	.09	.11	.10	.62***	.14	.19	.02	-
11.	Control structure 4 (Others)	2.4	0.72	.10	.07	.12	.17	.08	.13	.08	.04	.10	.02

N = 49 * p <0.1 ** p <0.05 *** p< 0.01 B: broad, N: narrow, F: formal, S: social, T: tight, L: loose

Table 2. Relationship between parent strategies, control and IJV performance based on chi-square test

Hypothesis			Control	Performance	χ2	DF	Decisions
Strategic Motive	H1a:	Gaining access to local firm proprietary resources	N,S,L	+	13.92	5	significant at 0.025
	H1b:	Gaining economies of scale and scope	N,F,L	+	12.30	5	significant at 0.05
Strategic importance	H2:	IJVs are very importance to foreign parent firms	B,F,T	+	16.05	5	significant at 0.01
Strategic Focus	H3a:	Domestic focus	N,F,L	+	15.90	5	significant at 0.01
	H3b:	Export focus	B,F,T	+	13.79	5	significant at 0.025
Competitive Strategy	H4a:	Low cost strategy	N,F,L	+	12.21	5	significant at 0.05
	H4b:	Differentiation strategy	B,F,T	+	12.01	5	significant at 0.05
Control & Performance	H5	Control structures fit with strategies leading to positive performance	CS1; CS2; CS3	+	16.52	5	significant at 0.01

CS1: Control structure 1 (B,F,T), CS2: Control structure 2 (N,S,L), CS3: Control structure 3 (N,F,L)
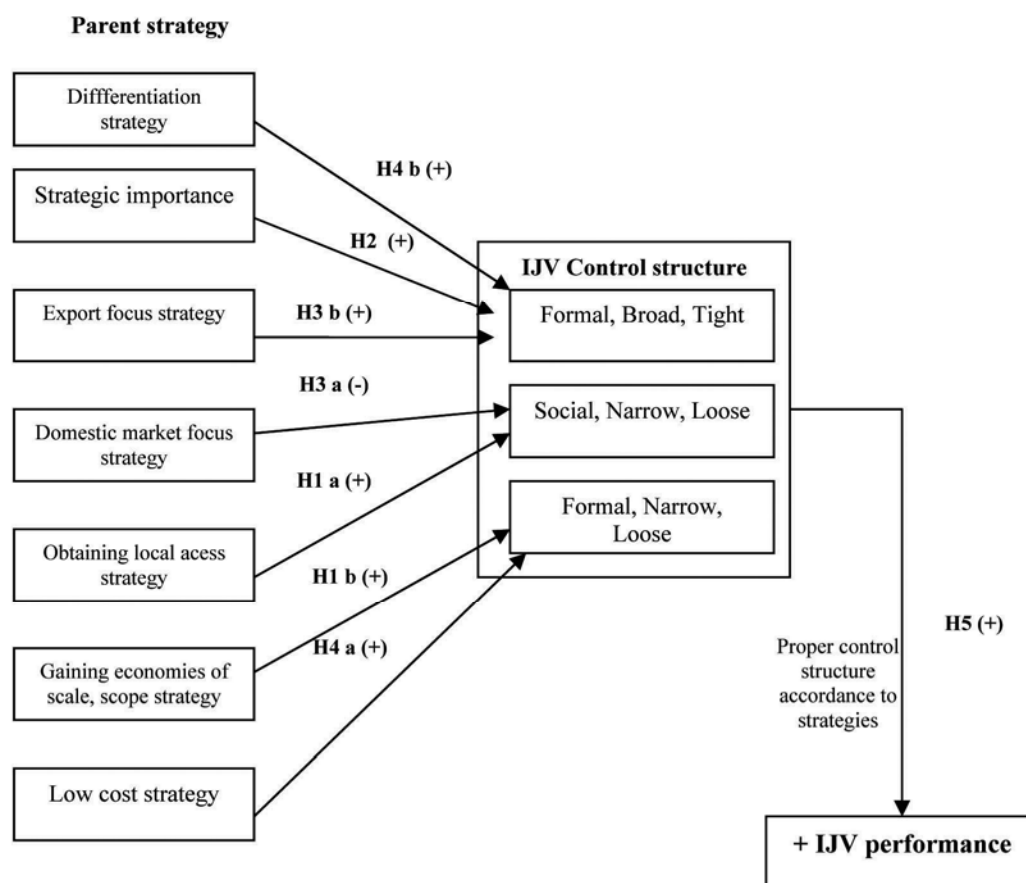
Figure 1. Relationships between foreign parent strategy, control, and IJV performance

Appendix 1

Measurement of variables

Control dimensions

Control mechanisms

    Formal control
    a.   *Appointment of key venture personnel*
    b.   *Participation in the venture board meetings*
    c.   *Incentive plans for top management*
    d.   *Financial reports*
    e.   *Exercising veto rights at the board meetings*
    f.   *Taking part in planning JVs budgets*
    g.   *JV general manager participates in parent worldwide meetings*
    h.   *Parent-IJV face to face communication, formal meeting*
    i.   *Participation in JV's decision making*
    j.   *Control based on equity share*

    Social control
    k.   *Feedback*
    l.   *Parent-venture informal socialization (informal phone call, outdoor activities)*
    m.   *Parent training of venture managers*

Measured on a 5 point-scale, the respondents were asked to assess their method of monitoring and control of the IJVs. Control mechanism is formal (F) if the parents exercise control more on formal mechanisms (from a. to j. with responses value from 4 to 5). On the other hand control mechanism is social (S) if parents exercise control mechanisms more on k. to m. (with response value from 4 to 5).

Control focus
    a.   *International marketing*
    b.   *Local marketing*
    c.   *Domestic sales*
    d.   *Human resources*
    e.   *Procurement*
    f.   *Production*
    g.   *Quality control*
    h.   *Prices and costs*
    i.   *Financing and accounting*
    j.   *Research and development*
    k.   *Legal or local government relations*
    l.   *General management*

Measured on a 5 point-scale, the respondents were asked to assess the focus areas of their monitoring and control of the IJVs. Control focus is broad (B) if parents exercise control on all or almost all the areas from a. to l. (with response value from 4 to 5). On the other hand, control focus is narrow (N) if the parents exercise control on less than 3 areas (with response value from 4 to 5).

Control extent
degree or tightness of control which is exercised on the venture based on control mechanisms and control focus

Control is tight *(T) if parent firms exercise more than three control mechanisms and broad control over the IJVs. Control is loose when parent firms exercise less than 3 control mechanisms and narrow (N) control*

Strategies

Strategic motive:
    -Access to local firm resources
    -Achieving economies of scale

Strategic importance

Strategic focus
    - Domestic focus
    - Export focus

Competitive strategies
    - Cost leadership
    - Differentiation

Measured on a 5 point-scale, respondents were asked to evaluate their strategies used in IJVs with 1= "not important at all" to 5= "very important"

Performance
    Financial performance
    Total performance

Measured on a 5 point-scale, respondents were asked if they satisfied with IJV performance on both financial and total performance with 1= "very unsatisfied" to 5= "very satisfied".

The Impact of Establishing the University Centre Oldham

on the Development of the Oldham Brand

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Abstract

Branding is key to organisational success. Effective branding helps create appropriate product or service associations which enhance the profile of an organisation and its products. The University Centre Oldham is part of the University of Huddersfield which was established in Oldham in August of 2005 to takeover the Higher Education provision in the Oldham borough. Prior to this development the provision of Higher Education in Oldham was a makeshift arrangement of the Oldham College in conjunction with the Oldham Council and the Oldham Sixth Form College. These three institutions do not have degree awarding powers nor are they Higher Education providers. The result of this scenario was an array of validation arrangements with a multitude of degree and diploma awarding institutions. This was a complex situation which was very difficult to implement. This study concluded that the establishment of the university in the borough has created new hope in skills development, investment attraction and above all infrastructural development. The impact on the branding of Oldham is significant and it augurs well for the future. This development mirrors renowned university cities and towns where the establishment of a university has been the driver for development. The University of Huddersfield has made a significant difference in the town of Huddersfield and following on from the same experience in an economically depressed area the concept of "Towns like us" by which the strategy to establish the two university centre of Barnsley and Oldham were created is already starting to make a significant difference in Oldham just like the University of Huddersfield did in the town of Huddersfield.

Keywords: Education, Development, University, Branding, Market positioning, Place marketing and Oldham

1. Introduction

The *Oldham Beyond*, strategy document clearly states the significance of education in the renewal of the borough:

An educated population, the University Centre is the jewel in the crown in the transformation of the educational threshold of the community and raise the skills of the borough.

The Oldham borough is changing in its appeal to the community in the Northwest of England, the broader UK community and the international stakeholders because of significant developments over the years that have changed both the social standing, business investments and the infrastructure of the area. The events of 2001 that saw the borough embroiled in ugly violent scenes sent a message of chaos, instability and despair about the area as international headline news. The promotional manual *Think you know Oldham? Think again..!* encapsulates what the corporate message is emphasizing in using phrases as *Great People, Great Place, Great Prospects.* Significant efforts are being made to create a new image and a new brand. The University Centre Oldham was borne out of the desire to boost skills in the borough as part of the broader regeneration strategy.

The regeneration efforts as laid out in the blueprint for the future of Oldham, *Oldham Beyond* has cast high expectations on the future of the borough. One of the key developments captured in the strategic plan of the borough is the University Centre which is pivotal to the successful regeneration of the borough. In the meantime a huge debate has engulfed the borough. There are consultations going on in the borough that seek to address the branding of Oldham. An article in the Oldham Advertiser newspaper titled, *anyone for a name change?* Suggestions are being made about the possibility of changing the name in order to create a better appeal. The seriousness of the borough's desire to improve the brand is demonstrated by the fact that £50 000-00 British pounds (approximately USD 100 000) has been made available for consultancy to be carried out by   Hemisphere – a marketing and design consultancy – to create a "strong and positive brand for Oldham" to look into means and ways of re-branding so that it can attract investment and give a positive feeling about the area (http://www.oldhamadvertiser.co.uk/news, accessed 27.09.07). The total cost of

rebranding as reported by the BBC came to £100 000 (approximately USD 200 000), http://news.bbc.co.uk/1/hi/england/manchester/7351420.stm, accessed 5 December 08.

The sign of a university in a town or city could make a significant impact on how the town is viewed. Common knowledge about cities suggests that cities like Oxford in UK the home of the highly reputable University of Oxford are critical to the economic performance and general progress of the city. In the case of the University of Oxford the basic statistics of the university's finances are that, "In 2005–6, the combined income of the University, Oxford University Press and the Colleges amounted to £1,294 million. Within that £1,294 million, the University's income amounted to £609 million, a 14.8 per cent rise on the previous year's total." http://www.ox.ac.uk/about_the_university/facts_and_figures/index.html#aoxford_colleges, accessed, 2.01.08. While the University Centre Oldham is not a huge institution it is logical to speculate on the positive effect it has in creating confidence in the borough and also the potential investors. Mutual cooperation between the University Centre Oldham and various organisations in the borough augurs well for development. Equally the idea of a sign in the town centre that suggests the existence of a university says a lot to both the people of the borough, visitors to the borough and potential investors. If names as Harvard Business School, University of Cambridge, University of Oxford, University of Manchester, London Business School among others should be such household institutions in their cities and attracting so much resources it is not out of context to speculate that there is a level of economic impact associated with a university in a city.

1.1 Objective of the Study

This paper seeks to make an assessment of the effects of establishing the University Centre Oldham on the brand of the town and the borough at large. The study will evaluate the effects of University Centre Oldham on the community aspirations, widening participation and the investment drive in tandem with other efforts meant to change the image of the borough. Ultimately the study will put into perspective the impact universities have had in other towns and cities and extrapolate that into the scenario of University Centre Oldham in the Oldham borough.

2. Branding and Perceptions

Chernatony and McDonald (2003 : p 25) suggest that, "A successful brand is an identifiable product, service, person or place, augmented in such a way that the buyer or user perceives relevant, unique added values which match their needs most closely. Furthermore, its success results from being able to sustain these added values in the face of competition". It is important to re-emphasize the ability of the item, place or service to meet expectations as a critical aspect in brand building. The ability to satisfy will determine whether or not customers are satisfied. Oldham has a character shaped by the people who live in the area, the infrastructure, social cohesion, shopping facilities, appearance of commercial and residential buildings, the tourist attractions in the area and the leadership of the borough's messages about where the borough is going. The key is the answer to the question, "What does Oldham stand for?"

Hankinson (2004 : p7) argues that "In an increasingly competitive market therefore, destination marketers must seek a fuller understanding of the nature of images held by both individuals and organisations in order to build more favourable brand images and thereby enhance a destination's attractiveness and economic development. ….. The marketing of many destinations does not begin from a zero base. It frequently begins with a set of negative or positive attributes established over a long period of time based through communication processes largely independent of marketing's control. " Therefore the associations of Oldham have far reaching effects on the making of its brand. Ultimately the stories, the investments and any related developments in the town centre and its surrounding areas impact on the brand and that includes the University Centre Oldham among other institutions. He further asserts that in the case of a tourist destination self-congruity is a major factor in determining favourable destinations for visitors. In the case of branding of a place…things like progressive, cheap, opportunity etc may make a difference. In looking at the aspects of the place it is important to take into cognisance that the place is a bundle of attributes, very much like the age old story of the description of an elephant by ten blind men who would describe depending on the part of the elephant they touched.

In the re-branding and repositioning of Oldham it is important to take into cognisance the fact that "… in the UK, cities such as Manchester, Birmingham, Sheffield, Leeds, Nottingham, Cardiff, Bristol and Bradford, and towns such as Huddersfield, have adopted regeneration strategies that include strategies to promote creative industries. Within these initiatives it is common for city centres to become the symbolic and economic focus of rejuvenating city-regions. In many localities, this also includes the agglomeration of creative and cultural industries and particularly the development of 'quarters' (Bell and Jayne, 2003 :p 126). The Oldham town centre is the hub of both social and economic activities in the borough, thus confirming the assertions by Jane and Bell. The regeneration of Oldham has changed the face of the borough in many respects, ie repositioning and re-branding the borough. The face of the town centre has some educational beacons that say a lot in both the perception and physical structure of the institutions in the form of The Oldham College (TOC), The Oldham Sixth Form College (OSFC). The message suggests that Oldham town centre is an education hub and it does not need a sophisticate to argue the case for education being a drive for modernity and

development and obviously there are so many industries that thrive on education that are benefiting from the existence of educational institutions.

Hankinson (2005: p25) puts forward three key points on the unique characteristics of place marketing as follows:-

- First, places exist both as holistic entities or nuclear products and as collections of contributory elements or individual services and facilities. The job of the destination marketers is to select a portfolio from these individual elements to form the basis of a destination product.

- Second, the place product can be assembled uniquely by each visitor from their experiences of a chosen set of individual contributory elements as referenced from Ashworth and Voogt (1990).

- Third, places are multi-functional. The same place can offer historical buildings, shopping facilities, sports facilities and entertainment venues.

Oldham has a rich and diverse history with multitudes of scenarios that paint different pictures of hope, dominance, dilapidation, dilapidation, chaos, war and renewal. The current standing of Oldham is a state of renewal from an economic slump and gloom. The events of 2001 when the town went into smoke with race confrontation that made major headlines the world over helped shift the attention of the national government and Europe to channel resources in a regeneration programme that has become the centrepiece of the renewal of Oldham. While more still needs to be done the prospects for Oldham are bright and the communities are more hopeful and constructive. Communities are shifting in their lifestyle and attitude towards development. The coverage in the local press of the establishment of the University Centre was big news suggesting that Oldham had established its own university, no wonder some locals refer to the university centre as the "*University of Oldham*". The bottom line is that the university centre has contributed to the improving pride and confidence in the prospects of Oldham.

3. The Oldham Branding Scenario

In the main the vision for the borough captures the phenomenon of Oldham at three levels, Oldham Before, Oldham Today and Oldham Beyond.

Below is a brief discussion of the ten key ideas as espoused in the vision document, the *Oldham Beyond*:-

- **New business**, concentration of business in two areas Hollinwood off a major motorway and the Mumps Roundabout near the city centre.

- **A creative borough**, capturing the talents and nurturing them in Oldham for utilisation of such talents in Oldham

- **The mills of Oldham**, a number of them have already been converted into creative workspace and more is in the pipeline

- **An intercultural borough**, the unique aspects of the ethnic groups and their uniting factors should help spearhead multitudes of activities that should enrich the borough.

- **An educated population**, the university centre is the jewel in the crown in transformation of the educational threshold of the community and raise the skills of the borough.

- **Smart communities**, better, safe communities will create a better place to live in through housing renewal.

- **Regeneration web**, by linking the many places that make up Oldham with attractive places and features will make the whole borough a better place.

- **Common ground**, by creating more favourable common meeting areas, in particular the town square it would create more integrated communities.

- **Sustainability**, what is done within the borough should not jeopardize the environment, socially and economically.

- **Many places not just one**, the borough is made up of many communities which are well integrated and the whole borough is part of Greater Manchester.

- The Oldham Town Centre Partnership (2006) which is core to coordinating the work of a variety of stakeholders states its mission as:

"To create the conditions for a major step change in the growth and competitiveness of Oldham Town Centre and to maximise its life, vitality and commercial viability as a sub-regional destination in Greater Manchester"

The aims of the Oldham Town Centre Partnership business plan April 2006 –March 2009 (2006: p 11) are laid out as follows:-

- To improve the IMAGE of the Town Centre and promote it as a sub regional

- shopping, leisure, tourism and commercial destination

- **Aim 2**

- To further enhance the COMMUNICATION and CO-OPERATION within the Town Centre and between all Town Centre organisations and individuals

- **Aim 3**

- To encourage and facilitate improvements to the PHYSICAL ENVIRONMENT of the Town Centre and to ensure high standards of maintenance

- **Aim 4**

- To continue to improve and promote the SAFETY, SECURITY and ACCESSIBILITY of the Town Centre to all its users

- **Aim 5**

- To promote the Town Centre as a focus for COMMUNITY COHESION and encourage ownership of the Town Centre as 'common ground' for all sections of Oldham's community

- **Aim 6**

- To aid the process of INWARD INVESTMENT into the Town Centre

- **Aim 7**

- To MONITOR the performance of Oldham Town Centre and the Town Centre

- Management Initiative

- The aims of the plan which are communicated to any interested party by virtue of this being a public document are meant to create a sense of progress in the city centre. The aims provide assurances that the borough has a lot happening that should lead to a more appealing image. The messages are clearly an expression of well founded aspirations in the transformation of the town centre and the borough at large. These claims or stated objectives come with multitudes of obligations in respect of the use of land, the development of the infrastructure, raising people's aspirations and the general provisions for society.

While the objectives of the Oldham Town Centre Partnership do not explicitly state the critical importance of education in the transformation of the borough there is no doubt that a lot of the developments mentioned benefit substantially from an educated population. Moreso, if the population of Oldham becomes more educated that also helps change their aspirations for prosperity and is working well for the reputation of the borough and also for the borough. The existence of the University Centre Oldham should be seen as a catalyst in development in a number of ways, firstly the university centre attracts certain industry, a certain type of consumption by the student population, provides employment for people coming from beyond the confines of Oldham and above all creates new aspirations in the community to seek education at higher levels to enhance prospects in life.

4. Think You Know Oldham? Think Again!!! (A summary of the Key arguments)

Oldham Metropolitan Borough (2006) in a document by the Oldham Partnership, ie., The Local Strategic Partnership (LSP) which brings together public, private, community and faith sectors to coordinate their input in development believe they are on top of the situation. The message implies that there are misconceptions that need to be cleared about the image of the Oldham borough. The top cover has a subheading with three key attributes of Oldham clearly declaring *Great People, Great Place and Great Prospects.* The message is meant to create favourable perceptions about Oldham and thereby attract tourism traffic, inward investment flows, reduce the loss of local skills to other areas, attract a highly skilled workforce and improve the borough. The Oldham Partnership has been availed £400 million of government funding to drive the agenda for development in Oldham with the focus being on:

- *Building Safer and Healthier Communities* – This would entail crime reduction, increase in life expectancy and improve the local environment

- *Transformational regeneration*- This incorporates flagship initiatives for University and the Colliseum Theatre, improvement of local housing conditions and the revitalisation of the town and district centres.

- *Inspiring Enterprise and Economic Development*- This will require improvement in employment, encouragement of new business growth and improvement of adult skill levels.

- *Investing in our Children and Young People*- This would mean improvement in health and educational attainment.

- The brochure starts by laying out the background to the borough by highlighting the diversity of the geography of Oldham, the cultural diversity of its people, the hardworking nature of the people, proximity to buzzing Manchester city and Leeds that Oldham is where the industrial revolution started and is now undergoing another revolution quietly. The brochure clearly states the aspirations "So this is Oldham today. The past was good, but

the future will be even better. Could you be part to it." (Oldham Partnership, 2007: p7). There are clear signs of a developmental momentum that has started in the transformation of the borough. There are many advertisements in the brochure by companies that are based in Oldham which are identified with the changes taking place in Oldham.

The transformation has replaced the defunct household textile business of Oldham with modern business as electronics to usher in a new revolution. The brochure reports that the people of Oldham identify themselves as being in Greater Manchester, being in Lancashire or just Oldhamers. Oldham is within the proximity of the buzzing city of Manchester which is the hub of commercial activities in the Northwest of England. Oldham has one of the most beautiful scenery in England and that should help in attracting tourism into the area. The transport network makes it easier to travel around the borough as there is a good road, good rail network and the respective infrastructure is in good shape. Oldham has space equivalent to 33 football pitches for development and that gives scope for attracting more investment. The Tommyfield market attracts people beyond the confines of the borough and the education levels and standards are rising with the advent of the establishment of the University Centre Oldham (UCO) which is a part of the University of Huddersfield. The university centre is expanding in order to accommodate the increasing numbers the university centre has to cater for. The brochure also claims that Oldham has a number of attributes similar to Paris which puts the borough in a very strategic position given the hub for attracting business and tourism into the area.

These developments in Oldham as already alluded to follow the years of success when Oldham was the leading textile city in the world. The subsequent dilapidation, economic degradation and ultimately race confrontations in 2001 tell a story that looked irreparable. The situation had deteriorated badly before the developmental upsurge made possible by the riots which triggered a new wave of investment, EU funding and government financial support to banish the bad patch in the history of Oldham. The state of affairs in terms of infrastructure, social cohesion across different racial groups, the general flow of inward investment and human capital would not change into a great place in less than ten years. Certainly with the university there is scope for development because the educated community will go into business as well as provide the emerging industry an educated workforce. Those reasons augur very well for attracting major investors from Manchester and Leeds.

5. Oldham's Community Strategy –Planning for Sustainable Communities 2005-2020

The long term plans of the borough serve as the explicit expression of intent and help project the aspirations of the borough. In the main the planning process serves as a barometer for achievement expressed in different measures and tends to be very objective in their assessments in the form of a SWOT analysis. On page 4 of the strategy document the vision for 2020 is clearly centred on, *"The world will see the Borough as a transformed place."*

Page 3 of the strategy document states the mission as follows:-

Our Values, on which we will build a better future, will continue to shape everything we do:-

- *We believe in good, safe, living environment for everyone present and future*
- *Oldham, a place where everyone is proud to leave*
- *We believe in an inclusive and openly democratic Oldham*
- *We oppose all forms of unfair discrimination*
- *We believe that everyone has rights and also responsibilities*
- *We believe in an open Oldham in which all benefit fairly*
- *We believe in a multi-faith, multi-cultural and multi-racial society*
- *We believe in the worth of every person in Oldham*

The mission clearly puts forward the case for community cohesion which embraces identity, equality and engagement in the advancement and rebuilding the borough, comprising the seven district centres. The borough has strategically aligned itself with the Northern Way agenda (ie, the development of a significant national contribution in the Northwest of England) and the fifteen year Housing Market Renewal programme in order to change the face of Oldham and to cement the borough's position in the drive for economic development.

The key themes of the community strategy are:-

- Community Cohesion
- A Strong and Vibrant Economy
- Health and Well-Being for All
- Safe and Strong Communities
- Well Educated and Highly Skilled People

- Children and Young People – Our Future

- An Improved and Valued Environment

- A Place of Culture

- Decent Homes for All

- A Thriving Voluntary, Community and Faith Sector

One of the key themes of the community cohesion strategy is *Well Educated and Highly Skilled People* which confirms the importance of education in driving the development agenda of the borough. The execution of the borough's agenda is driven by the availability of people who can execute functions or tasks that help realise the various objectives of the borough.

6. Conclusions

The OMBC has gone through a strategic transformation aided by the regeneration programme that has repositioned and re-branded the place. The establishment of the University Centre Oldham has added to the impetus for development. The image of a ghost city in dilapidation took a turn for the better. The town centre has taken a new shape, a city reinvented in terms of both the structures and occupants, a people reborn and recreated in both aspirations and opportunities. While the heinous events of 2001 tainted the city as a riotous poor city in dilapidation the subsequent regeneration programme that has seen massive amounts of money expended on Oldham have gone a long way in improving the image of the borough. The face of OMBC especially the town centre has been uplifted and continues to improve. The various documents that have been produced to inform policy such as the Ritchie report and the Cantle report have emphasized the need for community integration in a bid to harness the energies of all the stakeholders in an effort to change the prospects of the borrow for the better. The people needed education on the value of race cohesion and skills for development and prosperity.

The various strategies and tactics that have been employed in the regeneration and renewal of Oldham have been complemented by strategic corporate communications which were meant to create a favourable perception in the minds of the various stakeholders. The Oldham Chronicle, the local print mouthpiece of the borough has covered a lot of different phenomenal developments in the borough. The OMBC's development wing in the form of the Oldham Partnership in conjunction with the borough's marketing department has published a brochure titled *Think You Know Oldham! Think Again; Great Place, Great People, Great Prospects* which seeks to emphatically put the case for development across to the stakeholders. These developments cannot take place with the overarching drive that comes through an educated populace. In the main there is clear evidence of the borough's phenomenal turnaround from dilapidation to hope and prosperity but there is still a long way to go to attain greatness as the brochure would seek to portray.

The University Centre Oldham provides a great promise for the prospects of the future labourforce in Oldham. The university centre suggests that the future workforce will be educated and that there is potential for a young population to role into Oldham for good education. The infrastructural developments in the borough are going to enhance the movement in and around the borough and the links with major cities as Manchester and Leeds are convenient given the proximity of the major roads leading to these cities and rail network in connecting to those areas. The establishment of the University Centre Oldham has a huge impact on the transformation of the borough. Ultimately the Oldham brand will be a reflection of the amount of the exploitation of education and the exploitation of relevant skills for its agenda for development and the closer to home the education hub is to the borough the easier it is to exploit the resource. Therefore in view of the glaring cases of the significant impact of universities in many towns and cities it can be argued persuasively that University Centre Oldham can help turnaround the already improving Oldham brand.

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An Empirical Study on the Adoption of RFID Technology

for Logistics Service Providers in China

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Abstract

The purpose of this paper is to study the influences of technological, organizational and environmental factors on the adoption of RFID technology for logistics service providers in China. While the growth of China's economy hinges to a large extent on the ability of the logistics industry to operate more efficiently and effectively in the global supply chain system, China's logistics companies should pay attention to adopt more efficient logistics technologies to provide better services for their customers. The data to study the factors affecting the adoption of RFID technology came from a questionnaire survey of logistics service providers in China, and 574 logistics companies were analyzed. According to the survey results, about fifty percents of logistics companies are interested in RFID technology, but less than ten percents have the experiences of using RFID technology. Explicitness and accumulation of technology, organizational encouragement for innovation, quality of human resources, and governmental support exhibit significant influences on the willingness to adopt RFID technology.

Keywords: RFID technology, Logistics service providers, Technology adoption, Innovation, China

1. Introduction

Due to the emergence of the concept of supply chain management, logistics management has become a strategic factor that provides a unique competitive advantage in the global market (Christopher, 1993). One of the keys to effective supply chain management is to make the logistics function more efficiently in the supply chain. Consequently, the logistics industry plays an important role in the supply chain (Bowersox, Closs & Cooper, 2002). The purpose of logistics is the supply of service or product to the demander or demanding unit at the right time, with the right quantity, in the right quality, with the right cost and at the right place. Logistics management is a kind of programming, implementing and controlling process dealing with the flow from the primitive occurring point to the final consumption point and the storage efficiency as well as the cost benefit of raw material, half-finished product, finished product and related information, for the purpose of satisfying the customer's requirement (Bowersox & Closs, 1996). The globalization of supply chain has prompted many firms to develop logistics as a part of their corporate strategy (McGinnis & Kohn, 2002). To deliver products quickly to customers, many companies seek to outsource their logistics activities to logistics service providers. This reflects the trend of using logistics companies to satisfy increasing need for logistics services (Lieb & Miller, 2002). More than two decades of economic reform and transition to market economy has brought China unprecedented economic growth. With the fast growth in China's economy and China's accession into WTO, the demand for logistics services has been growing significantly in China, and the logistics industry in China is set to take off. The total logistics value has grown by 29.9 percents year-on-year (Li & Fung Research Center, 2005). New modern facilities such as logistics parks, distribution centers and warehouses are being built at a record setting pace. Many logistics companies have invested extensively in information and logistics technologies. As China

continues to develop into a global manufacturing factory, China's logistics industry will play an important role in the global supply chain.

Over the past decade, many logistics service providers have acknowledged that their supply chains are not responsive enough. If they are willing to operate more efficiently and responsively, they must adopt technologies that will help manufacturers, warehouses, and retailers to communicate with each other more efficiently (Cohen, 2000). With the rapid growth of technologies, our economic society and life are changing significantly in the 21st century. How to capture company's competitive advantage has become the most important issue for mangers in the rapidly changing and uncertain business environments. An amount of research has shown that the adoption of technological innovations is the most important tool for enterprises to keep their competitive advantage. Recently, a body of evidence shows that logistics companies can increase their performance by employing new technologies. Many logistics companies began to improve their operation efficiency by continuous implementation of information or automation technologies according to their business characteristics (Mason-Jones & Towill, 1999; Sauvage, 2003). Nixon (2001) suggested that logistics companies should employed new information technologies to raise their service capability in the e-commerce age. Speakman (2002) proposed that logistics companies could increase their performance by employing new technologies. Sauvage (2003) found that technological effort is the key variable and means of differentiation between logistics companies. Chapman, Soosay and Kandampully (2003) suggested that logistics industry should pay more attention to innovation in logistics service and the innovation in logistics can be implemented through technology, knowledge and relationship networks. Therefore, it can be concluded that technological innovation is important for China's logistics industry. Most operations in China's logistics industry are labor-intensive, and rely on the input of a large number of service workers. Nowadays, in the age of knowledge-based economy, how China's logistics industry can be transformed from labor-intensiveness into knowledge-intensiveness, and how they can make full use of the market intelligence to create knowledge and further take advantage of the knowledge to innovate products, services as well as strategies to promote the competence of organizations, are the topics worth taking into deep consideration. Continuous technological advancement can assist China's logistics industry to revolutionize the way they operate and conduct their business.

Among many logistics technologies, radio frequency identification (RFID) technology has been taken as an important application in logistics operations and supply chain management (Srivastava, 2004; Angeles, 2005; Smith, 2005). Federal Express, Dell, Proctor and Gamble, the US Department of Defense, and the European retailer Metro Group have begun to utilize RFID technology in their supply chain systems (RFID Journal, 2004). Moreover, much like Wal-Mart did with electronic data interchange (EDI) and bar code development, Wal-Mart has been beginning to drive the adoption of RFID technology, which will mean significant changes in the way supply chains are managed. Wal-Mart has announced that they would require all of their larger suppliers to implement RFID on every box and pallet shipped to Wal-Mart by 2005 (Boyle, 2003). RFID technology is one type of auto-identification technology that uses radio waves to identify individual physical objects. An RFID tag consists of two main components: an antenna and a chip containing an electronic product code. RFID technology is compact and robust, and has been used for in many applications including the manufacturing and distribution of physical goods. It can help item level identification, which is useful for easily and efficiently identifying each item within the entire supply chain (Davis & Luehlfing, 2004). Due to the application of radio frequency, we can interact with the product items without physical contact, and as a result, increase our handling efficiencies. In summary, RFID technology provides a tool for real-time data communication and can close the information gaps in the supply chain, especially in retailing and logistics; therefore RFID technology allows for better control of supply chain due to effective information sharing and real-time data communication (Yao & Carlson, 1999; Angeles, 2005; Prater, Frazier & Reyes, 2005).

However, while a body of research has been conducted on the application of RFID technology, what has been missing is a discussion of the drivers or influencing factors that lead various industries to consider RFID (Prater, Frazier & Reyes, 2005). Although RFID technology has garnered a great deal of research interest, most research has primarily focused on the specifics of the technology, or its impact on general supply chain issues, such as its general promise of cost and time savings (Donovan, 2003; Kärkkäinen, 2003; Kunii, 2003; Niemeyer & Pak, 2003; Davis & Luehlefing, 2004; Srivastava, 2004; Angeles, 2005; Smith, 2005). Some studies argued that the key factor for widespread usage of RFID technology is its cost (Donovan, 2003). However, it is still not clear whether other technological factors and organizational and environmental context will affect the adoption of RFID technology. Therefore, this paper will investigate the adoption of RFID technology in China's logistics industry. The main purpose of this paper is to conduct questionnaire surveys in China to explore the factors that affect RFID technology adoption by logistics service providers from the perspective of technology, organization and environment. An understanding of the influencing factors is essential in order for practitioners to best implement a new technology, and for researchers to best understand what issues need to be addressed.

The next section introduces the theoretical foundations of the determinants of adopting RFID technology. The third section gives a description of the research methodology, while the fourth section focuses on the analysis of the results and the discussion of the findings. The final section gives research conclusions.

2. Determinants of Technology Adoption

Companies achieve competitive advantage through acts of innovation. They approach innovation in its broadest sense, including both new technologies and new ways of doing things (Porter, 1990). Betz (1997) assumed that innovation is to introduce a new or improved product, process, or service into the marketplace. Afuah (1998) proposed that innovation is the use of new technical and administrative knowledge to offer a new product or service to customers. The product or service is new in that its cost is lower, its attributes are improved, it now has attributes it never had before, or it never existed in that market before. Innovation is any practices that are new to organizations, including equipments, products, services, processes, policies and projects (Kimberly & Evanisko, 1981; Damanpour, 1991). Past research has argued that distinguishing types of innovation is necessary for understanding organizations' adoption behavior and identifying the determinants of innovation in them (Knight, 1967; Rowe & Boise, 1974; Downs & Mohr, 1976). Among numerous typologies of innovation advanced in the relevant literature, the pair of types of innovation, administrative and technological (or technical) innovation, is commonly used (Damanpour, 1991). Technological innovation pertains to products, services, and production process technology; it is related to basic activities and can concern either product or process (Knight, 1967; Damanpour & Evan, 1984). Administrative innovation involves organizational structure and administrative processes; it is indirectly related to the basic work activities of an organization and is more directly related to its management (Knight, 1967; Kimberly & Evanisko, 1981; Damanpour & Evan, 1984). Because the implementation of RFID technology is still in its infancy (Davis & Luehlefing, 2004), it is reasonable to assume that the adoption of RFID technology can be taken as an innovative process for a logistics company. Therefore, we will utilize the concept of technological innovation as the theoretical foundation to study the factors affecting the adoption of RFID technology.

A body of research studied the determinants or influencing factors on innovation (Kimberly & Evanisko, 1981; Amabile, 1988; Tornatzky & Fleischer, 1990; Damanpour, 1991; Wolfe, 1994; Tidd, Bessant & Pavitt, 1997). Kimberly and Evanisko (1981) suggested that the individual factor, organizational factor, and contextual factor would influence hospital adoption of technological innovation. Kwon and Zmud (1987) classified variables affecting technology adoption into individual, task-related, innovation-related, organizational, and environmental characteristics. Tornatzky and Fleischer (1990) suggested that the adoption and implementation of technological innovation would be affected by the technological context, organizational context, and the external environmental context. Patterson, Grimm and Corsi (2003) indicated that technology adoption is affected by organizational size, structure, and performance, supply chain strategy, transaction climate, supply chain member pressure, and environmental uncertainty. Scupola (2003) used technological, organizational, and environmental characteristics to explain the adoption of Internet commerce. This paper will investigate the influence of technological, organizational, and environmental factors on the adoption of RFID technology in China's logistics industry. Although the individual factor might affect adopting RFID technology for logistics companies, this paper will not investigate each individual's influence on the company's adoption of RFID technology.

2.1 Technological Factors

Technologies can be viewed as one kind of knowledge (Grant, 1996). Tsai and Ghoshal (1998) found that an organization will have higher innovative capability when knowledge can be shared more easily within the organization. The transferability of knowledge or technology will influence technological innovation; technological innovation can be advanced when the technology has higher transferability. The transferability of technology is determined by the explicitness of technology. It is more easily to transfer or share technological knowledge with higher explicitness (Grant, 1996; Teece, 1996). In addition to the explicitness of the technology, how the technology fits with the technologies that a firm already possesses will also be another important technological characteristic (Tornatzky & Fleischer, 1990; Chau & Tam, 1997). Teece (1996) found that technological innovation usually follows a technological paradigm. The cumulative nature of technologies will influence the innovation in technologies. Grant (1996) and Simonin (1999) also concluded that an organization with rich experiences in the application or adoption of related technologies will have higher ability in technological innovation. Therefore we would expect that explicitness and accumulation of technology might influence the adoption of RFID technology. The following hypotheses are consequently proposed:

Hypothesis H1a. *The more the explicitness of the RFID technology, the more likely that the logistics service providers will adopt RFID technology.*

Hypothesis H1b. *The more the accumulation of the related technology in the firm, the more likely that the logistics service providers will adopt RFID technology.*

2.2 Organizational Factors

A body of research about organizational behaviors has argued that certain features of organizations themselves, including structures, climates, and cultures of organizations, will influence the adoption of innovation (Kimberly & Evanisko, 1981; Tornatzky & Fleischer, 1990; Russell & Hoag, 2004). Amabile (1988) found that the management skills, organizational encouragement for innovation, and support of innovation resources would help the improvement of organizational innovation. Tornatzky and Fleischer (1990) suggested that informal linkages and communication among the employees, the quality of human resources, top management's leadership behavior and the amount of internal slack resources would significantly influence the adoption of technological innovation. A firm with higher quality of human resources such as better education or training will have higher ability in technological innovation. Therefore we would expect that encouragement for innovation and quality of human resources might influence the adoption of RFID technology. The following hypotheses are consequently proposed:

Hypothesis H2a. *The more the encouragement for innovation, the more likely that the logistics service providers will adopt RFID technology.*

Hypothesis H2b. *The higher the quality of human resources, the more likely that the logistics service providers will adopt RFID technology.*

2.3 Environmental Factors

In addition to technological and organizational characteristics, the external environment in which a firm conducts its business will also influence the innovative capability (King & Anderson, 1995). Miles and Snow (1978) found that organizations would pay more attention on innovation when they faced environments with higher instability and chaos. Kimberly and Evanisko (1981) concluded the environmental complexity and uncertainty would influence the organizational innovation for hospitals. Damanpour (1991) found that environments with high uncertainties would have positive influences on the relationship between organizational structures and organizational innovation. Zhu and Weyant (2003) suggested that demand uncertainty tends to increase firm's incentive to adopt new technologies. Governmental support is another important environmental characteristic for technological innovation. Government through regulation can both encourage and discourage the adoption of innovation (Tornatzky & Fleischer, 1990; Scupola, 2003). Government can provide financial incentives, pilot projects, and tax breaks to stimulate technological innovation for logistics companies. Therefore we would expect that environmental uncertainty and governmental support might influence the adoption of RFID technology. The following hypotheses are consequently proposed:

Hypothesis H3a. *The more the environmental uncertainty, the more likely that the logistics service providers will adopt RFID technology.*

Hypothesis H3b. *The more the governmental support, the more likely that the logistics service providers will adopt RFID technology.*

3. Research Methods

3.1 Data Collection and Sample Description

The data to test our hypotheses come from a questionnaire survey of logistics service providers in China. As China becomes a global manufacturing factory, China's central and local governments delivered several policies to reinforce the logistics industry (Jiang, 2002). Moreover, after China's accession into WTO, allowing foreign logistics companies to operate in China more freely boost the growth of China's logistics industry. More and more logistics companies in China begin to adopt technological innovations to increase their logistics service capabilities. However, the logistics industry in China is still in its infancy compared with its counterparts in more developed countries. Ta, Choo and Sum, (2000) found that the logistics barriers to international operations in China include the lack of cargo tracing services, the lack of delivery reliability for local carriers, the lack of carrier selection, complicated customs procedures, and geographical fragmentation of transportation networks.

Generally, logistics companies carry out logistics activities for their customers, which include warehousing, transportation, inventory management, order processing, and packaging (Sink, Langley & Gibson, 1996; Delfmann, Albers & Gehring, 2002). The sample frame was drawn from members of the logistics councils in Beijing, Shanghai and Shenzhen regions because the development of logistics industry in these three regions are more mature than other regions in China. The Beijing Municipal Government has placed the establishment of a highly effective logistics platform by 2010 in its tenth five-year development plan. The Shanghai Municipal Government has been giving priority to the development of three large-scale logistics parks during its tenth five-year plan period. The Shenzhen Municipal Government plans to develop logistics services into one of the three mainstay industries in the 21st century. Six hundred questionnaires were mailed or delivered directly to the sampled companies in each region from June to August in 2006. In order to get a higher rate of response, we also personally deliver questionnaires to some logistics companies in each area.

In total, we delivered 1800 questionnaires and 617 questionnaires were returned, 177 in Beijing, 219 in Shanghai and 221 in Shenzhen. Of these respondents, 43 uncompleted or unconfident questionnaires were excluded. The overall response rate is 31.9 percent. The basic information of these companies is shown in Table 1. In China, most logistics companies belong to small and medium size enterprises. Because RFID technology has been seen as a product data identification technology to replace bar code, we also surveyed the experience of using bar code for logistics companies. We can find that about sixty percent of logistics companies in China have the experience of using bar code in their logistics service processes. According to the survey results, it can be found that about fifty percent of logistics companies are interested in RFID technology, but only about eight percent of logistics companies have the experiences of using RFID technology.

Insert Table 1 about here

3.2 Measures

To test above hypotheses, data were collected by means of delivering questionnaires to logistics service providers in China. The questionnaire contains company's basic information, technological factors, organizational factors, environmental factors, and the adoption of RFID technology. Besides the company's basic information, the other items were measure using the 5-point Likert scales anchored by 'strongly disagree' and 'strongly agree'. The willingness to adopt RFID technology is measured. In addition, the adopting behaviors in RFID technology were also asked in the questionnaire to investigate the current application of RFID technology by the logistics industry in China.

Explicitness of technology was measured according to the degrees that the technology can be transferred and codified (Grant, 1996; Teece, 1996; Tsai & Ghoshal, 1998). Accumulation of technology was measured according to the degrees of fitness of related technologies a firm that possessed (Grant, 1996; Chau & Tam, 1997; Simonin, 1999). Organizational encouragement for innovation was measured according to the degrees that companies' resource supports and leaders' attitudes (Amabile, 1988; Tornatzky & Fleischer, 1990). Quality of human resources was measured according to employees' information skills and innovation capabilities (Tornatzky & Fleischer, 1990). Customers' requirements, competitors' innovative abilities, and development of logistics technologies were used to measure the environmental uncertainty (Kimberly & Evanisko, 1981; Zhu & Weyant, 2003). Governmental support was measured from the perspective of finance, technology, law and human resources (Tornatzky & Fleischer, 1990; Scupola, 2003).

In this paper, the measured scales were submitted to factor analysis. Varimax rotation was used because it is the most commonly used and can minimize the number of variables that have high loadings on each factor and simplify the interpretations of the factors. Factors with eigenvalues greater than 1.0 are summarized in Table 2, Table 3, and Table 4. The technological factors consist of "explicitness of technology" and "accumulation of technology"; organizational factors consist of "encouragement for innovation" and "quality of human resources"; environmental factors consist of "environmental uncertainty" and "governmental support." From the results of factor analysis, we can confirm the construct validity of this study. Results of the reliability analysis are also illustrated in these tables. The overall reliability is 0.8416. As the smallest value of Cronbach's alpha for this study is 0.7821, the sampling results are reliable (Nunnally, 1978).

Insert Table 2 about here

Insert Table 3 about here

Insert Table 4 about here

Table 5 shows the correlations among these factors and the willingness to adopt RFID technology. The correlation matrix gives us initial evidences of our hypotheses: technological, organizational and environmental factors are associated positively with the adoption of RFID technology. Moreover, the technological, organizational and environmental factors are not highly correlated.

Insert Table 5 about here

4. Results and Discussions

To find the influences of technological, organizational, and environmental factors on the adoption of RFID technology, the method of multiple regression analysis was used in this study. Based on the above results obtained by the method of factor analysis, the technological factor is classified into explicitness of technology and accumulation of technology; the organizational factor is classified into organizational encouragement and quality of human resource; the environmental factor is classified into environmental uncertainty and governmental support. This paper took these six factors as independent variables and the willingness to adopt RFID technology as the dependent variable, and consequently, employed the method of regression analysis to determine their relationship. Moreover, as firm size and history (Spencer, 2003) and past experiences or related technologies (Grant, 1996; Simonin, 1999) might influence the adoption of technological innovation, company history, number of employee, capital size, and bar code experience are taken as the control variables in the regression analysis.

Before applying the regression model, we examined whether the regression assumptions of homoescedasticity, linearity, normality, independence of residuals, and the absence of multicollinearity are satisfied. Based on a plot of residuals versus predicted values, we found that the assumptions of homoescedasticity and independence of residuals are met. To examine the assumption of linearity, scatterplots for all independent variables against the dependent variable in a pairwise manner were inspected. The assumption of linearity seems to be satisfied. The Anderson-Darling test was used to examine the normality of residuals. Because the obtained test statistic A^2 is 0.3604 (*p-value* > 0.1), the assumption of normality holds (Stephens, 1974). Multicollinearity was examined by checking the values of variance inflation factor (VIF) in this study and it was found that the VIF values are all less than 10 and therefore we can confirm that there is no extreme multicollinearity in the regression model (Hair, et al., 1998). Moreover, we could also confirm that autocorrelation does not present in the residuals of the regression equation because the Durbin-Watson value is 1.698 which lies within the range of critical values (Hair, et al., 1998). The results of regression analysis are shown in Table 6.

Insert Table 6 about here

From Table 6, we can find that the technological, organizational and environmental factors have positive influences on the adoption of RFID technology. Explicitness of technology, accumulation of technology, encouragement for innovation, quality of human resources, and governmental support all exhibit significantly positive influences on the willingness to adopt RFID technology for China's logistics companies. This means that the hypotheses, *H1a*, *H1b*, *H2a*, *H2b*, and *H3b* are accepted, but the hypothesis *H3a* is not accepted. We can conclude that higher explicitness of technology can help the transfer of technological knowledge within the organization and, therefore, raise the capability and willingness to adopt RFID technology. More accumulation of related technologies can make logistics companies have more related knowledge to adopt RFID technology. Actually, the positive relationship between the experience of using bar code and the willingness to adopt RFID technology also reveals the positive influences of accumulation of technology. Organizational encouragement for innovation can give employees motivation and support to adopt new logistics technologies, such as RFID technology. High quality of human resources means that employees are capable of learning and using innovative logistics technology like RFID technology. Governmental support can encourage and guide logistics service providers to adopt RFID technology.

The reason that environmental uncertainty did not have significant influences on the adoption of RFID technology may be due to the fact that most logistics companies in China are small and medium size. Providing flexible logistics service to satisfy customers' varying requirements is their major competence. Environmental uncertainty is common to these logistics companies. Therefore, environmental uncertainty did not have significant influences on the adoption of innovative logistics technology such as RFID technology for logistics service providers in China.

5. Conclusions

Since the China's government has been actively formulating policies to encourage a stronger linkage between the national economy and the global economy, China has become an important investment destination for multinational corporations. More and more foreign companies invest in China to take advantage of low labor costs and the potentially huge market. However, many foreign investors have faced several logistics problems such as the transportation of materials or products and the flow of information. The logistics cost in China is still high compared to many developed countries. To solve the logistics problems, accelerating the development of the logistics industry is one of the major economic policies of the China's government.

To improve their logistics services, many logistics service providers in China begin to adopt innovative logistics technologies. Advanced technologies and innovations play a critical role in expediting further growth of the logistics industry in China. However, there is a lack of empirical research on the adoption of innovative logistics technologies in China. As RFID technology is one of the innovative logistics technologies, this paper investigated the factors influencing the adoption of RFID technology in China's logistics industry. From the research results, we can find that only a few of logistics companies in China had the experiences of using RFID technology though about half of logistics companies were interested in RFID technology. This implies that the application of RFID technology in China's logistics industry is still in its infancy. There is a vast area of RFID market in China for RFID technology providers.

Logistics companies play an important role in the supply chain systems. As logistics companies must pay more and more attention to innovation in logistics technologies to provide better services for their customers, most of them begin to utilize many innovative logistics technologies to improve their performance and reinforce their competitive advantages. Based on the research results, we can conclude that higher explicitness of technology can help the transfer of technological knowledge within the organization and, consequently, can raise the willingness of adopting RFID technology. Therefore, to increase the logistics company's willingness to adopt RFID technology, RFID technology providers can improve the explicitness of RFID technology. Logistics companies can also increase their ability to adopt RFID technology by accumulating more related technologies, by encouraging or supporting their employees to learn new technology and by training and educating their employees to become knowledge workers. Therefore, based on our

research about the adoption of RFID technology in China's logistics industry, both logistics companies and RFID technology providers can plan better strategies to improve the development and application of RFID technology in China's logistics industry.

In addition, the government also plays an important role in the adoption of RFID technology in China's logistics industry. Under normal condition, the viability of technologies that are on the cutting edge as well as the economic consequences of using these technologies could be largely unknown. An investment in replacing and redesigning existing technologies and processes in a competitive environment is financially significant and involves substantial risk. Without governmental action, it would be even more risky to make the decision to adopt new technologies and processes (Kemp, 1993). As the application of RFID technology in China's logistics industry is still in its initial stage, the China's government should provide financial incentives, pilot projects, and tax breaks to stimulate technological innovation for logistics industry. The willingness to adopt RFID technology will be reinforced for logistics companies if the government can provide various supports of resources and continuous encouragement policies.

This paper only studies the influences of technological, organizational and environmental factors on the adoption of RFID technology in China's logistics industry. While there are differences between China and other countries in political structures, cultural background, historical perspective, social value, and so on (Li-Hua and Khalil, 2006), logistics service providers in different countries may have different views on the influences of these influential factors on the adoption of RFID technology. It will be worthwhile to advance a cross-national comparative study on the adoption of RFID technology among logistics industries in China and in other countries. In addition, there are some limitations to our research. Because we used the questionnaire survey, it is possible that the results of this study might suffer from the respondent bias. As we know, logistics companies cover a wide range of service types. In this study, we did not take the influences of service types of logistics companies on the adoption of RFID technology. There might be different effects of technological, organizational and environmental factors on the adoption of RFID technology for different logistics service types. It is worthwhile to carry out further studies on the moderating effect of logistics service types on the adoption of RFID technology. Moreover, other possible influential factors on the adoption of RFID technology will also be taken into consideration in further studies

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Table 1. Basic Information of the Sample

	Category	Number	Percentage (%)
Company history (Years)	0~5	394	68.6
	6~10	133	23.2
	11~20	37	6.4
	Above 20	10	1.7
Number of employee	Below 50	209	36.4
	51~100	197	34.3
	101~300	104	18.1
	301~500	44	7.7
	Above 501	20	3.5
Capital (Million, RMB Yuan)	Below 1	137	23.9
	1~5	188	32.8
	5~10	121	21.1
	10~50	79	13.8
	Above 50	49	8.5
Bar Code experience	Yes	351	61.1
	No	223	38.9
Adoption of RFID	Yes	44	7.6
	No but Interested	251	43.7
	No and Uninterested	279	48.6

Table 2. Result of Factor Analysis for Technological Factors

Items	Factor loading (Standardized)	
	Factor 1	**Factor 2**
Explicitness of technology (Factor 1)		
It is easy to find books or other resources about the technology.	0.821	0.134
It is easy to learn the application of the technology from the books.	0.803	0.121
It does not need too many experiences to learn the technology.	0.786	0.193
It is easy to understand that technology	0.751	0.207
Accumulation of technology (Factor 2)		
It is necessary to have experiences in using related technologies.	0.112	0.809
Our company has implemented many related technologies.	0.204	0.783
It is easy to integrate that technology with company's current logistics system.	0.143	0.742
Eigenvalue	4.201	2.983
Variance explained	36.241 %	31.087 %
Accumulated variance explained	36.241 %	67.328 %
Cronbach's α for each dimension	0.8311	0.8287
Cronbach's α	0.8301	

Table 3. Result of Factor Analysis for Organizational Factors

Items	Factor loading (Standardized)	
	Factor 1	**Factor 2**
Encouragement for innovation (Factor 1)		
Company's leaders encourage employees to learn new information.	0.849	0.147
Our Company provides rewards for innovative employees.	0.821	0.131
Our company provides supports for employees to learn new information.	0.794	0.109
Company's leaders can help employees when they face new problems.	0.753	0.113
Quality of human resources (Factor 2)		
Employees can learn new technologies easily.	0.100	0.839
Employees usually provide new ideas for companies.	0.136	0.807
Employees possess abilities to use computer to solve problems.	0.171	0.751
Employees can share knowledge with each others.	0.261	0.725
Eigenvalue	4.622	2.831
Variance explained	35.982 %	31.793 %
Accumulated variance explained	35.982 %	67.775 %
Cronbach's α for each dimension	0.8832	0.8481
Cronbach's α	0.8694	

Table 4. Result of Factor Analysis for Environmental Factors

Items	Factor loading (Standardized)	
	Factor 1	**Factor 2**
Governmental support (Factor 1)		
Government provides financial support for the development of logistics technologies	0.869	0.063
Government encourages companies to propose projects of logistics technologies	0.831	0.089
Government help training manpower with logistics skills	0.795	0.112
Government relieves the regulation for the logistics industry	0.766	0.037
Environmental uncertainty (Factor 2)		
The advance in new logistics technologies is quickly	0.083	0.836
Competitors usually provide new logistics services	0.094	0.808
Customers' requirements are diversified	0.116	0.780
Customers' requirements vary quickly	0.143	0.731
Eigenvalue	4.231	2.483
Variance explained	37.533 %	31.986 %
Accumulated variance explained	37.533 %	69.519 %
Cronbach's α for each dimension	0.8308	0.7821
Cronbach's α	0.8085	

Table 5. Result of Correlation Analysis

Variables	Means	Std	1	2	3	4	5	6	7
1. Explicitness of technology	3.79	0.89	1.0						
2. Accumulation of technology	3.26	0.93	0.26	1.0					
3. Encouragement for innovation	4.01	0.81	0.18	0.25	1.0				
4. Quality of human resources	3.86	0.96	0.25	0.31	0.38	1.0			
5. Environmental uncertainty	3.01	1.05	-0.03	0.06	0.08	0.11	1.0		
6. Governmental support	4.15	0.68	0.09	0.15	0.12	0.08	-0.06	1.0	
7. Adoption of RFID technology	3.58	1.02	0.41[+]	0.58[**]	0.61[**]	0.66[**]	0.33	0.71[**]	1.0

+ $p<0.1$ * $p<0.05$ ** $p<0.01$

Table 6. Standardized Regression Results for the Determinants of RFID Technology Adoption

Predictors	Model 1		Model 2	
	Coefficient β	t	Coefficient β	t
Control variables				
Company history	0.010	0.593	0.005	0.610
Number of employee	0.031	0.861	0.022	0.774
Capital size	0.038	1.502[+]	0.028	1.024
Bar code experience	0.063	1.721[+]	0.052	1.654[+]
Technological factors				
Explicitness			0.161	2.831*
Accumulation			0.193	4.438**
Organizational factors				
Encouragement			0.152	4.114**
Human resource			0.188	3.986**
Environmental factors				
Uncertainty			0.098	1.154
Government			0.199	4.587**
R^2	0.093		0.541	
adj R^2	0.072		0.493	
F	1.010		6.863**	
Durbin-Watson value	1.689		1.798	

[+] $p<0.1$ * $p<0.05$ ** $p<0.01$

Hospitals Quality Competition and Specialization Choice

under Regulated Price

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Abstract

Non-price competition strategy is a major health policy concern in many countries. This paper studies the treatment specialization choice and quality level competition among hospitals. We extend a two-stage spatial duopoly model, with the partially altruistic providers firstly choosing specialization and then determining quality level when the treatment price is set exogenously by central planner. The first best conclusion of quality is that two hospitals always invest equally much is quality, which suggests the "quality weapon" between hospitals in reality. Then, specialization-quality equilibrium gives the conclusion that quality competition introduces a centrifugal effect in the specialization game. And with the unmatched cost between patients disease and hospital's specialization is lower, hospitals' equilibrium quality level and specialization differentiation will decrease.

Keywords: Hospital, Quality, Specialization

1. Introduction

Hospitals are recently undergoing growing pressure to improve the quality of their service and quality is the basic dimension to competition. Hospital care is vertically differentiated by quality and horizontally differentiated according to specialization it is professional in (Kesteloot, 1998, pp.701-728). Patients' being troubled in some kinds of disease, and they choose the hospitals of high quality and reputation and meantime those are good at curing their disease. Comprehensive hospitals with advanced equipment, skilled physicians, good reputation are capable of handling complex diseases. However, unmatched between disease and hospitals' profession is costly, particularly for patients of high risk. So, there is a tradeoff between unmatched cost and service quality when patients choose where they will choose to accept service.

In China, hospital care industry has undergoing considerable changes since 1980s. The major problems China's health sector today faces lie in the widespread inefficiency and inequity in resource use, as well as the rapid cost increase in health care. One of the most important measure taken by Chinese government is price regulation. The prices paid by fee-paying patients are set by government, with the dominant concern being to make sure that basic services are affordable to the whole population. At the heart of the issue of pricing policy in the Yellow Book price list-a detailed listing of thousands of medical procedures, services and diagnostic tests. Prices have tended to be set below cost for simple and non-invasive care and above cost for more complex care. The intention is that patients who need basic care receive it. So, the dominant concern for hospital manager in strategy is not price competition, while it is specialization choose and how much to invest in quality improving.

To study competition between hospitals, Xavier(2003, pp.25-51) and Siciliani(2005, pp.201-215) model competition within a Hotelling framework and in a duopoly model with differentiated products respectively. Existing models of competition and regulated prices are not fully adequate for assessing the impact of China's reforms, because they are not tailored to be institutional features of the health sector (Karen, 2004). The aim of our paper is to study hospitals competition when patients disease are distributed on a line and hospitals compete for both the optimal specialization and quality level. We shall assume that prices are regulated by central planner. We also consider the heterogeneous patients demand, partly benevolent providers and convex costs that are non-separable in activity and quality.

2. The model

2.1 Patients choice

To analyze competition and interaction among hospitals, we extend the Hotelling framework (Hotelling, 1929, pp.41-57) and refer to the different variables and parameters of the model in terms of health care market. Although the model is a

variant of the well-known spatial economics, it is frequently applied to analyze product differentiation and specialization choice (Eaton, 1975, pp.27-49). We consider a regional market for health care where each of two hospitals, indexed by $i = 1, 2$, choose a location and a quality level on the unit line $[0,1]$ (assuming $x_1 < x_2$). On this line segment, there is a uniform distribution of patients with heterogeneous diseases, with total mass normalized to 1. Assuming full market coverage, the decision patients make is to choose which hospital to demand treatment from. Here, we can interpret the patients' location as the specialization of disease or the level of severity she suffers from, and the two hospitals are differentiated with their profession. The utility derived by the patient who is located at z seeking treatment at hospital i at x_i is given by

$$U(z, x_i, q_i) = v + q_i - t|z - x_i| - p \qquad (1)$$

Where v is the gross valuation of medical treatment, which is assumed to be equal to all patients. q_i is the quality provided by hospital i, that is to say the quality level is one the major concern for patients to choose where to go; t is a travelling cost parameter, which is also interpreted with association with the cost of inappropriate match between services the hospitals provide and patients need (Calem, 1995, pp.1182-1198; Brekke, 2007, pp.147-170). p is the service fee charged to patients, also known as out-of-pocket money, and in the health care, it is fixed to the patient of the same insurance type.

The location $\bar{z}$ of patient (specialization or severity of disease) who is indifferent between getting service from either hospital is given by:

$$q_1 - t|\bar{z} - x_1| = q_2 - t|x_2 - \bar{z}| \qquad (2)$$

Therefore,

$$\bar{z} = \frac{1}{2}(x_1 + x_2) + \frac{q_1 - q_2}{2t} \qquad (3)$$

Total demand facing hospital i identified as D_i is given by $D_1 = \bar{z}$ and $D_2 = 1 - \bar{z}$. The demand here is defined as the number of cases, regardless of all differences in case-mix. To future analyze the demand reacts to the changes in specialization and quality of the hospital, we get

$$\frac{\partial D_1}{\partial q_1} = \frac{1}{2t(x_2 - x_1)} > 0, \frac{\partial D_1}{\partial q_2} = -\frac{1}{2t(x_2 - x_1)} > 0, \frac{\partial^2 D_1}{\partial q_1 \partial t} = -\frac{1}{2t^2(x_2 - x_1)} > 0 \qquad (4)$$

Notice that demand increases with the improvement of quality, and decreases with the improvement of quality in counterpart. It is the fact that when price is regulated, hospitals may have a strong incentive to engage in non-price e.g. quality competition, and quality effort may further has a negative spillover effect to the demand of rival hospital. For example, hospital 1 purchasing a CT-scanner, may induce some of hospital 2's patients to opt for hospital 1, so the quality is then said to have a market expansion effect (Shaked and Sutton, 1990, pp.45-62). Further, higher matching cost decrease the demand responsiveness to changes in quality of services.

2.2 Hospital objective function

The hospitals' objective function needs to be specified. In China, most of high level hospitals have a not-for-profit status and are public established, also it is not very proper to assume that hospitals in China aim at profit maximizing. Therefore, we consider a provider who cares about the benefits patients get from treatment as well as the net revenue hospital get and disutility because of cost (Ellis and McGuire, 1986,pp.192-151; 1990; Glaze and McGuire, 1994):

$$U = \beta B(\cdot) + \Pi_i = \beta B(\cdot) + R_i - C_i \qquad (5)$$

The function $B(\cdot)$ refers to the benefit patients get from treatment in hospital i. The parameter $\beta \in (0,1)$ suggests the degree of altruism the hospital is. The higher β, the more benevolent the provider is. A provider who equally benefit of patients and net revenue would have β equal to one, while a profit-maximizing hospital set $\beta = 0$ (Ellis, 1986, pp.129-151; Chalkley, 1998, pp.1-19). The benefit of patients in hospital 1 is given by:

$$B_1(\cdot) = \int_0^{\frac{1}{2}(x_1+x_2)+\frac{q_1-q_2}{2t}} \left[v + q_1 - t|z - x_1| - p \right] dz \qquad (6)$$

The benefit of patients from hospital 2 is of the same form. Yielding,

$$\frac{\partial B_1}{\partial q_1} = \frac{1}{2t}(v + q_1 - p) + \frac{1}{4}(x_2 - x_1) + \frac{q_1 - q_2}{4t} > 0 \qquad (7)$$

So, as the quality of service improve, patients benefit more in that it has two kind of effect. First, it increases per

patient's benefit from treatment, which is represented by the first term in Eq(7); second, it attracts more patients to get treatment in hospital *i,* which is shown by the second term of Eq(7).

Besides,

$$\frac{\partial^2 B_i}{\partial^2 q_i} = \frac{3}{4t} > 0 \tag{8}$$

With regard to hospitals income, an important part of hospital returns does not come from patient out-of-patient payments, but from health insurance companies. Usually, the insurer of health plan pays the provider a prospective payment *p* (net of any fixed costs), plus a reimbursement per service of δ (positive or negative) above variable cost *c,* that is to say, additional fee per service is $\delta + c$. In China, fee-for-service (FFS) payment is mostly applied under some other constraints such as global budget(Liu, 1998). In this case, A FFS payment system with a positive profit margin per service would be represent by $p = 0$ and $\delta + c > c$. While, under prospective financing the reimbursement is not based on the actual costs, and the hospital are reimbursed under a fixed amount of monger per case, for instance a flat prospective payment, which gains popularity in OECD countries, corresponds to $p > 0$ and $\delta + c = 0$. Providers' quality or behavior incentive under either retrospective or prospective or a mixture of both financing mechanism is widely studied, so this paper focus on the FFS payment system which is more accordance with Chinese reality.

The marginal cost of production is assumed to be independent of specialization of service and determined by quality level. So the total cost consists of two part, usual cost generated by providing service and improving quality, and total cost is increasing in both quantity and quality.

$$C_i = C_i(D_i, q_i) \tag{9}$$

We assumes that cost is increasing and strictly convex with demand of treatment because of the capacity restrict and convex with the improvement of quality in that quality improving efforts are modeled as involving diminishing returns, specified as increasing marginal costs of providing higher quality. The higher quality level a hospital has already reached, the more difficult it becomes to still improve on quality. Also, we assume $C_{Dq} \geq 0$, that is to say quality and quantity are complements: an increase in quality is more costly when more patients are treated (Brekke, 2008).

Thus, the net revenue hospital *i* gains can be described as

$$\text{FFS: } \Pi_i = R_i - C_i = (\delta + c)D_i - C_i = \delta D_i - C_i(q_i) \tag{10}$$

where $C_i(q_i)$ is the cost only to improve quality.

The timing in the model is as followings: The hospitals simultaneously choose the specialization; Then provider choose the quality level and patients choose treatments in response.

3. Equilibrium

The game with more than one stage is usually solved by backward induction. So we begin with analyze the Nash equilibrium result of hospital's quality level for a given specification and then for the choice of specification.

3.1 Quality competition

The first choice for the hospital to determine quality level is as the following function:

$$\beta B'(\cdot) - C'(q_1) = -\frac{\delta}{2t} \tag{11}$$

And the condition of the second order is $-C''(q_1) + \beta B''(\cdot) < 0$, that is to insure the existence of equilibrium, $C''(q_1)$ which is above 0 has a lowest bound. Using our assumption that $C''(q_1)$ is increasing and strictly convex, thus, the quality of hospital 1 must be over the lowest bound.

Because of the symmetric form of two hospitals' location choice and utility function, two hospitals always invest equally much is quality, which is common and rational when price is regulated. Quality of service is the 'competition weapon' for hospitals to attract more patient and to get larger market share. The result conform to Brekke's research (Brekke, 2006, pp.207-227).

$$\frac{\partial q_1}{\partial \delta} = \frac{-\dfrac{1}{2t}}{-C''(q_1) + \beta B''(\cdot)} > 0 \tag{12}$$

$$\frac{\partial q_1}{\partial t} = \frac{\frac{\delta}{2t^2}}{-C''(q_1) + \beta B''(\cdot)} > 0 \tag{13}$$

$$\frac{\partial q_1}{\partial \beta} = \frac{-B'(\cdot)}{-C''(q_1) + \beta B''(\cdot)} > 0 \tag{14}$$

$$\frac{\partial q_1}{\partial \Delta} = \frac{\frac{1}{4}}{-C''(q_1) + \beta B''(\cdot)} < 0 \tag{15}$$

The optimal quality level increase with the increase of reimbursement rate per service, which consists to our general knowledge; the quality level increase as the unmatched cost increases and as the differential level between hospitals decreases. This is due to the convexity of unmatched cost. And the more benevolent the provider is, the higher quality level it will pursue.

3.2 Location choice

At the stage 2 of the game, hospitals simultaneously choose their specialization, with the anticipation of their quality level, the first-order condition for an interior solution in the specialization game are given by:

$$\Delta = -\frac{\delta}{8t^2(\beta B'' - C'')} + \frac{(v + q - p) + \delta}{2t} > 0 \tag{16}$$

So, as the competition of quality level between hospitals, their choose the specialization with distinction, which can diminish the severity competition on one hand, and on the other hand, enjoy their reputation of proficient skill.

$$\frac{\partial \Delta}{\partial t} < 0 \tag{17}$$

It is known that if unmatched cost of patient to choose hospitals is lower, hospitals will have less incentive to pursue different specialization.

4. Conclusion

This paper reflects China's reality in hospitals' industry, where price are not feasible means of competition because it is set exogenous by central planner. And hospitals resort to other measures to increase market shares. In the absence of quality competition, we know that exogenous prices cause the hospitals to choose minimal differentiation. The paper gives a specialization-quality equilibrium and gets the conclusion that quality competition introduces a centrifugal force in the specialization game, which is conform to Brekke's conclusion. So, the tradeoff arises as to the strategic interaction for hospital managers between specialization and quality improve. Too severity of competing is not always good for patients in that unnecessary advanced treatment charge for a lot. And also it is a burden for small hospitals, and still induces close of some hospitals. Specially, pursue of high quality incur rapid growth of health expense, which a big problem most government face.

This paper is a trial in the discussion of the relationship between specialization and quality improve in health industry. In view of characteristic of hospital regulation and policy target, the result is significant in exhibiting the distinctive phenomenon in health care industry. While, for extension, the result need future induction in the aspects of making price exogenous but variable, and get implication for policy making in price setting. Besides, this paper did not distinguish types of patients, such as patients with high risk and lower risk. While, in reality, the model needs future consideration.

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An Empirical Study of Chinese Inflation Time Lag

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Abstract

Based on the current serious inflation problem at home and abroad, this thesis uses the data of broad money supply and monthly price during 1998 to 2008 and makes an empirical study on Chinese inflation time lag. Through the estimation of the Polynomial Distributed Lags Model, the author concludes that: money supply's change has significant time lag effect on price's change, and the lag time is about half a year; the effect is durative and the time is around 5 quarters; the impact of the time lag effect increases at first and then decreases, and its structure is Λ.

Keywords: Currency Inflation, Time Lag Effect, Explanatory Variables, Explained Variables

1. The Proposing of the Question

In the first half of this year, Chinese domestic prices of goods rose continuously, and the problem of currency inflation has become very prominent in society. Therefore, the goal of preventing the economy from being overheating and the rising prices from developing to inflation has been put forward by government in March. Moreover, controlling the growth rate of inflation at around 4.8 percent has also been taken as the first task of the government. Here, we could know how serious the impact of inflation has been. At almost the same time, the phenomenon of inflation occurred in other countries were also serious which even brought riots. All of these show that the current inflation has become a common problem in the world.

There are kinds of reasons to breed inflation. On one hand, the expansion of social demand and the shrink of supply could raise the price level; on the other hand, the increase of money and government expenditure, as well as the move downwards of the demand's curve could also cause inflation. Nowadays, more economists believe that the growing supply of money is the main reason of inflation. However, the increasing in money supply will not cause price to rise immediately because of time lag aroused by velocity of money circulation and other factors. As a stock variable, the incessant accumulation of intensifies the risk of inflation. But how long it will be manifest in the form of inflation due to the time lag of money supply? That is the focus of research to this thesis.

2. Literature Review

According to Fisher's Formula, we how MV = PQ. Here M represents that the average number of currency in circulation during a certain period; V represents the velocity of money circulation; P represents the price index of goods and services and Q represents transaction volume of goods and services. Fisher recognized that V and Q are invariable because V is decided by social system and custom and Q is stable under the condition of sufficient employment. Therefore, to some extent, the formula means the Quantity Theory of Money. In addition, the theory provides an interpretation that the change of price level only comes from money quantity. That is to say, P changes at the same ratio as M. But in reality, monetary policy has time lag effect which refers to the time between adjusting monetary policy and the occurring of its impact on economy when the economic situation changes. It is mainly composed of internal time lag and external time lag. The former refers to the interval from the need to take measures to correct economic changes to the central bank starts to take monetary policy tools, and the latter means the interval from the starting to the monetary policy tools impact on the object of it. In this thesis, it focuses on the external time lag.

Western scholars studied the time lag of monetary policy long time ago. After studying the relationship between money supply and price, Hume concluded that the quantity of money, whether it goes up or down, could not lead to the

changes of price immediately. There was always an intermission before the old situation adjusting to a new one. Keynes studied the factors restricting the role of monetary policy in the process of time lag effect, and focused his research on the transmission mechanism of money. In he view, the transmission process of monetary policy was indirect and fiscal policy was direct. Therefore, the effectiveness of monetary policy was slow and it needed at least one year to demonstrate its role. Because of the "stagflation" problem occurred in the early 1970s, some western scholars paid attention to the interval of money supply's change started to affect economy. Here Friedman was the most successful. After a large number of empirical studies, he found that it needed approximately 6 - 9 months from the changes of monetary supply to the changes of nominal national income and output, and it also needed approximately 6 - 9 months from the changes of nominal national income and output to the changes of price. So the time lag is about one or one and a half years from the changes of monetary supply to the changes of price.

In recent years, the time lag effect of Chinese monetary policy has been causing concern of economists and they have achieved gratifying results. Chaoyu Zheng (1994) recognized that the external time lag was surely more than a quarter. DaShu Wang (1995) viewed that the external effect of monetary policy would show out until a few months or even ten months after it was implemented. XianBing Zheng (1995) showed his studies that Chinese economic output time lag was about 5 quarters, and the price's was about 4 - 5 months. Whether monetary policy was tightening or expansion, the price time lag was shorter than the output's. YuanXun Mai, YeTian (2004) made use of VAR model and Variance Decomposition to study the time lag of Chinese monetary policy, and concluded that the time lag is 6 months, whether it was output or price's. He also concluded that the time lag was longer than the output's and that different money supply lead to different time lag. Gang Dong (2008) used VAR models and Impulse Response Function and quarterly data from 1996 to 2006, and concluded that the time lag caused by rate was 3 quarters and money supply was 2 quarters. He also got the result that the monetary policy time lag existed in both national output and price level. Combined with these previous researches, this thesis will explore this question by mainly using Polynomial Distributed Lags Model.

3. Model Specifications

This thesis is a study on the time lag of inflation, so the Polynomial Distributed Lags Model is a better choice. This model describe how the past lag variables impact on the current variables, and it can contact the different stages of economic phenomenon to each other and turn the static analysis of the economic activity into dynamic analysis which can explain the real economy better. The general form of the model is as following:

$$Y_t = \alpha + \beta_0 X_t + \beta_1 X_{t-1} + \beta_2 X_{t-2} + \ldots + \beta_s X_{t-s} + \upsilon_t$$

Here, s stands for the length of the time lag, β_0 stands for the spot multiplier which means that the impact of a unit change of current X on Y; β_i (i = 1,2, ..., s) stands for the delay multiplier, which means that the impact of a unit change of past X on Y. To the selection of variable, the author collects the data of national broad money supply (M_2) and monthly goods price during 1998 to 2008. The author makes M_{2zt}, the monthly growth of M_2, as explanatory variables. And the author makes the consumer price index CPI_t as explained variable. Put the two variables into the general model, we can get this:

$$CPI_t = \alpha + \beta_0 M_{2zt} + \beta_1 M_{2zt-1} + \beta_2 M_{2zt-2} + \ldots + \beta_s M_{2zt-s} + \upsilon_t$$

4. Model Estimation

Before estimate the above-mentioned model, we should estimate this model:

$$CPI_t = \alpha + \beta_0 M_{2zt} + \upsilon_t,$$

The result is as following:

Insert Table1, Table2, Table3, Table4

Of course, from the above result, we can see that the R^2 of regression equation is not large and DW value is low. That means there are other factors that affect price changes except for money supply; at the same time, too many lag variables may cause Multi - Linear problem. But if we only focus on the analysis of the time lag of money supply' change to price's, the above result is enough. We can change the model if we want to improve the forecast accuracy of it.

5. Conclusion

Through all these analysis, we can make such a conclusion: money supply's change has significant time lag effect on price's change, and the lag time is about half a year; the effect is durative and the time is around 5 quarters; the impact of the time lag effect increases at first and then decreases, and its structure is Λ.

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Table 1.

Dependent Variable: CPIT
Method: Least Squares
Date: 12/11/08   Time: 11:16
Sample (adjusted): 1998M01 2008M10
Included observations: 130 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	101.6791	0.308083	330.0385	0.0000
M2ZT	-0.066876	0.092728	-0.721208	0.4721

R-squared	0.004047	Mean dependent var		101.5231
Adjusted R-squared	-0.003734	S.D. dependent var		2.496246
S.E. of regression	2.500902	Akaike info criterion		4.686445
Sum squared resid	800.5775	Schwarz criterion		4.730561
Log likelihood	-302.6189	F-statistic		0.520141
Durbin-Watson stat	0.054758	Prob(F-statistic)		0.472097

From the regression result, the t statistic of M_{2zt} is not significant, which indicates the current money supply's change has not obvious impact on current level of price. In order to analyze the time lag of money supply's change to goods price, we estimate 3 months-lag of the model, the result is as following:

Table 2.

Dependent Variable: CPIT

Method: Least Squares

Date: 12/11/08   Time: 11:21

Sample (adjusted): 1998M04 2008M10

Included observations: 127 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	101.6694	0.409418	248.3265	0.0000
M2ZT	-0.116550	0.109715	-1.062295	0.2902
M2ZT(-1)	-0.035532	0.100117	-0.354903	0.7233
M2ZT(-2)	0.009164	0.099894	0.091735	0.9271
M2ZT(-3)	0.093499	0.109816	0.851420	0.3962
R-squared	0.012328	Mean dependent var		101.5520
Adjusted R-squared	-0.020054	S.D. dependent var		2.518057
S.E. of regression	2.543181	Akaike info criterion		4.743282
Sum squared resid	789.0678	Schwarz criterion		4.855258
Log likelihood	-296.1984	F-statistic		0.380705
Durbin-Watson stat	0.064998	Prob(F-statistic)		0.822073

From the regression result, the lag factor of M_{2zt} increases gradually, which shows that the impact of current money supply's change on price level will emerge gradually after a period of time. However, the t statistics of the lag factors is not significant, so we can not judge how long the time lag is. Therefore, we have to estimate 6 months-lag of the model, the result is as following:

Table 3.

Dependent Variable: CPIT

Method: Least Squares

Date: 12/11/08   Time: 11:22

Sample (adjusted): 1998M07 2008M10

Included observations: 124 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	101.3524	0.442888	228.8444	0.0000
M2ZT	-0.167980	0.108947	-1.541860	0.1258
M2ZT(-1)	-0.112311	0.109713	-1.023681	0.3081
M2ZT(-2)	-0.069705	0.108944	-0.639826	0.5235
M2ZT(-3)	-0.038630	0.116076	-0.332794	0.7399
M2ZT(-4)	0.087041	0.108945	0.798943	0.4260
M2ZT(-5)	0.146090	0.109630	1.332578	0.1853
M2ZT(-6)	0.259466	0.109391	2.371912	0.0193

R-squared	0.090659	Mean dependent var		101.6105
Adjusted R-squared	0.035785	S.D. dependent var		2.518898
S.E. of regression	2.473418	Akaike info criterion		4.711420
Sum squared resid	709.6646	Schwarz criterion		4.893374
Log likelihood	-284.1081	F-statistic		1.652130
Durbin-Watson stat	0.117385	Prob(F-statistic)		0.127743

Table 3 shows that the t statistics from M_{2zt} to M_{2zt-5} are not significant but M_{2zt-6} is significant under the 5% significance level. That is to say, the impact of current money supply's change on price level will emerge in the sixth month clearly. In order to study how long the time lag will be, we estimate 6 months-lag of the model, 9 months-lag, 12 months-lag, 15 months-lag, 18 months-lag, 21 months-lag and 24 months-lag step by step, and finally we find that the t statistics of lag factors from 22_{st} month start to become insignificant. To the regression coefficient, the change of money supply begins to impact goods price obviously from sixth month and it comes to a head until the 21_{st} month, then it declines gradually. The result is showed in Table 4.

Table 4.

Dependent Variable: CPIT
Method: Least Squares
Date: 12/11/08   Time: 11:41
Sample (adjusted): 2000M01 2008M10
Included observations: 106 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	98.81613	0.354303	278.9028	0.0000
M2ZT	-0.183914	0.072251	-2.545485	0.0128
M2ZT(-1)	-0.158488	0.075283	-2.105210	0.0384
M2ZT(-2)	-0.124133	0.074974	-1.655691	0.1017
M2ZT(-3)	-0.112983	0.075057	-1.505302	0.1362
M2ZT(-4)	-0.053793	0.075185	-0.715473	0.4764
M2ZT(-5)	-0.017812	0.077873	-0.228726	0.8197
M2ZT(-6)	0.059975	0.076119	0.787907	0.4331
M2ZT(-7)	0.050479	0.076752	0.657691	0.5126
M2ZT(-8)	0.068308	0.077353	0.883069	0.3798
M2ZT(-9)	0.012064	0.081737	0.147594	0.8830
M2ZT(-10)	0.039505	0.085335	0.462939	0.6447
M2ZT(-11)	0.038666	0.086098	0.449089	0.6546
M2ZT(-12)	0.131446	0.085698	1.533823	0.1290
M2ZT(-13)	0.127115	0.081982	1.550526	0.1250
M2ZT(-14)	0.107226	0.084880	1.263270	0.2102
M2ZT(-15)	0.091463	0.086023	1.063230	0.2909
M2ZT(-16)	0.084634	0.085505	0.989820	0.3252
M2ZT(-17)	0.096857	0.088445	1.095111	0.2768
M2ZT(-18)	0.126879	0.087556	1.449106	0.1512
M2ZT(-19)	0.164404	0.089828	1.830221	0.0709
M2ZT(-20)	0.174413	0.089303	1.953051	0.0543
M2ZT(-21)	0.194708	0.091654	2.124386	0.0367
M2ZT(-22)	0.173142	0.092817	1.865416	0.0658
M2ZT(-23)	0.103975	0.097326	1.068318	0.2886
M2ZT(-24)	0.106052	0.098557	1.076049	0.2851

R-squared	0.792364	Mean dependent var		102.1142
Adjusted R-squared	0.727478	S.D. dependent var		2.373482
S.E. of regression	1.239045	Akaike info criterion		3.475712
Sum squared resid	122.8186	Schwarz criterion		4.129009
Log likelihood	-158.2127	F-statistic		12.21158
Durbin-Watson stat	0.342002	Prob(F-statistic)		0.000000

Dimensionality of Organizational Citizenship Behavior (OCB)

in a Multicultural Society: The Case of Malaysia

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Abstract

Past researches have observed a shift in the dimensions of organizational citizenship behavior. Building on organizational citizenship behavior literature, the present study in the paper involved looking at validating the dimensionality of the organizational citizenship behavior (OCB) measure developed by Organ (1988) who posited a five dimension instrument. Data was gathered through a survey using a structured questionnaire to employees working in 10 large manufacturing companies in Malaysia. A total of 113 questionnaires were returned over a period of 10-week. A series of tests such as factor analysis, correlation, and reliability analysis was conducted to confirm that the instrument is valid (content, construct, convergent, discriminant and nomological) as well as reliable. Implications regarding the value of conducting validity and reliability test for practitioners and researchers are discussed.

Keywords: Organizational citizenship behavior, Goodness of measure, Validity, Reliability, Multicultural society

1. Introduction

Organizational citizenship behavior (OCB) was first illustrated in the work of Bateman and Organ (1983) 24 years ago and has recently been gaining momentum. OCB refers to the individual contributions in the workplace that go beyond role requirements as stipulated in the job agreement (Organ & Ryan, 1995). OCB of the organizational members is becoming increasingly crucial in the businesses nowadays in view of the downsizing, rightsizing in response to the economic pressures of the last decade. Hence, understanding how OCB works in organizations is an important issue of enquiry for both researchers and also practitioners. Recent studies had illustrated the dramatic growth of OCB researches into some other related management areas, for example, strategic management, leadership, human resources management, etc. OCB has been noted to have contributed favorably to organizational outcomes, such as service quality (Bettencourt & Brown, 1997; Bell & Menguc, 2002), organizational commitment (Podsakoff, McKenzie & Bommer, 1996), job involvement (Dimitriades, 2007), leader-member exchange (Bhal, 2006; Lo, Ramayah & Jerome, 2006).

Despite the importance of examining organizational citizenship behaviors in organizational for leadership effectiveness, a review of the literature have revealed a lack of consensus about the dimensionality of OCB, particularly in the Malaysia context. As stated by LePine, Erez, and Johnson (2002), these behavioral dimensions have yet to be differentiated from one another in the empirical literature even though many scholars have claimed that OCB is composed of conceptually distinct behavioral dimensions. Studies have found that there are approximately 30 forms of

citizenship behavior have been developed (Podsakoff, Mackenzie, Paine & Bachrach, 2000) and generally it can be grouped into seven dimensions known as, (i) Helping Behavior, (ii) Sportsmanship, (iii) Organizational Loyalty, (iv) Organizational Compliance, (v) Individual Initiative, (vi) Civic Virtue, and (vii) Self Development.

Hence, building upon the social exchange theory, the purpose of this study is to assess the validity (content, construct, convergent, and discriminant) and reliability of Organ's (1988) measures of centralization and formalization and, thereby to add clarity to the operationalization of this construct. The remainder of the paper is organized as follows. First, the foundation literature for the study will be reviewed, followed by research method, and findings are presented and discussed. Lastly, research suggestions are offered, and the contribution and the limitations of the study are highlighted.

2. Literature review

2.1 Organizational citizenship behavior

OCB has been widely used in the previous studies as it has been found to affect the overall organizational effectiveness (Walz & Niehoff, 1996). OCB is also known as extra-role behaviors which are the act of performing beyond the stated job requirement. Subordinates impulsively go beyond the employment contract and carry out non-obligatory task without expecting explicit rewards and recognition (Organ, 1988). Hence, understanding the determining conditions and reasons that lead to such behaviors is instrumental to yield an insight into when and how these acts happen. In fact, LePine et al. (2002) have demonstrated that leaders' support is the strongest predictor of significant OCB by subordinates. According to Aquino and Bommer (2003), they discovered that OCB can enhance the social attractiveness in a work unit. As OCB is normally labeled as positive behavior, those who exhibit OCB may become more socially attractive which makes them more likely to be appreciated as friends or partners.

Literatures in the past have identified two main approaches known as "role" and "extra-role behavior" in defining the concept of OCB. Extra role means the individual contributions in the workplace which go beyond the specified role requirements and not recognized by the reward system. Castro, Armario, and Ruiz (2004) concluded that it is not easy for a firm to differentiate between "role" and "extra role" performances as managerial and employee perceptions of their subordinates' performances do not correspond and subject to the satisfaction of the subordinates in the workplace. A great deal of researches have suggested that there are five basic personality factors which affect most of the variance in personality (e.g., Costa & McCrae, 1992) and these dimensions are known as Big Five dimensions which are classified as conscientiousness, altruism, courtesy, sportsmanship, and civic virtue. Hence, this study adopts the repertoire of Organ's initial definition of OCB with five dimensions and each dimension is discussed more in details in the following sessions.

2.1.1 Civic virtue

Civic virtue is defined as subordinate participation in organization political life and supporting the administrative function of the organization (Deluga, 1998). It is referring to the responsibility of the subordinates to participate in the life of the firm such as attending meetings which are not required by the firm and keeping up with the changes in the organization (Organ, 1988). This dimension of OCB is actually derived from Graham's findings which stated that employees should have the responsibility to be a good citizen of the organization (Graham, 1991).These behaviors reflect an employees' recognition of being part of organization and accept the responsibilities which entails (Podsakoff et al., 2000). Other researchers have found that civic virtue enhances the quantity of performance and help to reduce customer complaints (Walz & Niehoff, 1996).

2.1.2 Conscientiousness

Conscientiousness is used to indicate that a particular individual is organized, accountable and hardworking. Organ (1988) defined it as dedication to the job which exceed formal requirements such as working long hours, and volunteer to perform jobs besides duties. In addition to that, studies have also revealed that conscientiousness can be related to organizational politics among employees (McCrae & Costa, 1987). Kidder and McLean Parks (1993) posited the fact that males are more like to engage in conscientious behavior than females in view of the fact that males has preference for equity over equality.

2.1.3 Altruism

Smith, Organ, and Near (1983) defined altruism as voluntary behaviors where an employee provides assistance to an individual with a particular problem to complete his or her task under unusual circumstances. Altruism refers to a member helping other members of the organization in their work. Podsakoff et al. (2000) has demonstrated that altruism was significantly related to performance evaluations and correspondingly, positive affectivity.

2.1.4 Courtesy

Courtesy includes behaviors, which focus on the prevention of problems and taking the necessary step so as to lessen the effects of the problem in the future. In other words, courtesy means a member encourages other workers when they

are demoralized and feel discouraged about their professional development. Early research efforts have found that employees who exhibit courtesy would reduce intergroup conflict and thereby diminishes the time spent on conflict management activities (Podsakoff et al., 2000).

2.1.5 Sportsmanship

Organ (1988) defined sportsmanship as the behavior of warmly tolerating the irritations that are an unavoidable part of nearly every organizational setting. Podsakoff and MacKenzie (1997) revealed that good sportsmanship would enhance the morale of the work group and subsequently reduce employee turnover.

3. Research methodology

The main focus of this paper is to assess the goodness of measure (validity and reliability) of the organizational citizenship behavior measurement. The environment in which this study was carried out was in the Malaysian manufacturing sector.

3.1 Sample

Data for this study was collected from 113 managers working in 10 large scale manufacturing firms in Malaysia. The questionnaires, together with cover letters (seeking their cooperation and explaining the purpose of the study) and self-addressed stamped envelopes (for the completed questionnaires) were mostly personally handed to managers after a brief personal communication concerning the topic and the goals of the study.

3.2 Survey instrument

This study uses the five dimensions of OCB proposed by Organ (1988) as researchers have acknowledged the dimensions as the most widely used in organizational related studies (Gonzalez & Garazo, 2006). Twenty items were used to determine the level of citizenship behaviors among subordinates based on five main dimensions. Likert-like scale was used to measure the OCB elements, which used the anchors of 1 (Strongly Disagree) to 7 (Strongly Agree).

4. Research results

4.1 Sample Characteristics

Out of the 113 respondents, 61% of them were male, and 39% were female. The respondents were managers from different functional areas and were between the age group of 20 to 54 years. Twenty eight percent of the respondents hold bachelor degrees, followed by diploma holder (38%), and the rest have high school qualification (34%). A majority, 89% of them have been working for less than 10 years, whereas 11% of the respondents have worked for more than 10 years.

5. Testing the goodness of measure for the organizational structure construct

5.1 Content Validity

Content validity refers to the extent to which an instrument covers the meanings included in the concept (Babbie, 1992). In a similar vein, Rubio, Berg-Weger, Tebb, Lee, and Rauch (2003) refer to content validity as to the extent to which the items on a measure assess the same content or how well the content material was sampled in the measure. Essentially, the goals of content validity are to clarify the domain of a concept and judge whether the measure adequately represents the domain (Bollen, 1989). Content validation results in a theoretical definition that explains the meaning of the variable in question (Bollen, 1989) and is guaranteed by the literature overview (Gomez, Lorente & Cabrera, 2004).

5.2 Construct Validity

Researchers often use factor analytic techniques to assess construct validity of the scores obtained from an instrument (McCoach, 2002). Factor analysis represents a broad category of approaches and mathematical procedures for determining the latent variable structure of observed variables (Nunnally, 1978). In this study, an exploratory factor analysis with an orthogonal rotation of varimax was used to evaluate the construct validity of the instrument. In turn, to evaluate the construct validity, we performed a principal components analysis on the set of 20 items of the scale. The result of this analysis is summarized in Table 1.

The analysis extracted only a 4 factor solution, each with eigenvalues above one, which explain 59.64% of the total variance. The KMO was 0.817 indicating a meritorious level based on Kaiser and Rice (1974) and the Bartlett's test for sphericity was significant ($\chi2 = 976.34$, p , 0.01). Based on the rotated component matrix, out of the 20 items, 4 items were dropped either due to loadings less than 0.55 based on a sample size of 100 suggested by Hair et al. (2006) or cross loading in another component. Even though there were some items where cross loadings slightly exceeded 0.30, those items were retained because factor analysis should take into consideration the need for a conceptual basis for the variables analyzed (Hair et al., 2006).

5.3 Convergent Validity

Further to the construct validity test using the factor analysis (between scales) another factor analysis but this time using the within scale was utilized to test the convergent validity. According to Campbell and Fiske (1959), convergent validity refers to all items measuring a construct actually loading on a single construct. Convergent validity is established when items all fall into 1 factor as theorized. Convergent validity was carried out through a within factor, factor analysis in order to obtain a more in-depth judgment of the dimensionality of the construct under study (Hair et al, 2006). All the four factors displayed unidimensionality with Civic Virtues, KMO was 0.84 explaining 59 percent of the variation; Conscientiousness, KMO was 0.76 explaining 58 percent of the variation; Altruism, KMO was 0.70 explaining 76 percent of the variation; Courtesy, KMO was 0.74 explaining 60 percent of the variation. Thus, the analysis provided evidence of convergent validity.

5.4 Discriminant Validity

Discriminant validity refers to the extent to which measures of 2 different constructs are relatively distinctive, that their correlation values are neither an absolute value of 0 nor 1 (Campbell and Fiske, 1959). A correlation analysis was done on the 4 factors generated and the result is presented. As can be seen all the factors are not perfectly correlated where their correlation coefficients range between 0 or 1. Hence, we can conclude that discriminant validity has been established.

5.5 Nomological Validity

Nomological validity which is another form of construct validity is the degree to which a construct behaves as it should within a system of related constructs called a nomological set (Cronbach & Meehl, 1955). Cronbach and Meehl (1955) posited that in order to provide evidence that a measure has construct validity, a nomological network has to be developed for its measure. In essence what this means is that we have to develop a nomological link between the variable we would like to validate and another variable which has been proven theoretically to be related to this particular variable. For example it has been proven in many researches that commitment increases as job satisfaction increases. So when we validate the construct validity of a job satisfaction measure, we will use commitment to test the nomological validity. Leader-Member exchange (LMX) has been shown to significantly influence the level of OCB among employees as a high quality of LMX may motivate employees to exhibit extra-role behaviors without any formal rewards from the organizations. (Settoon et al., 1996). As LMX has been shown to be related to OCB, we used the Loyalty-Affect dimension of LMX to be correlated with the 4 dimensions of OCB and the result is presented in Table 3. As theorized, all the 4 dimensions were significantly related to LMX thus confirming nomological validity.

5.6 Reliability

Reliability measures the degree to which the test score indicates the status of an individual item on the factors defined by the test, as well as the degree to which the test score demonstrates individual differences in these traits (Cronbach, 1947 as cited in McCoach, 2002). "A reliability coefficient demonstrates whether the test designer was correct in expecting a certain collection of items to yield interpretable statements about individual differences" (Cronbach, 1951, p. 297 as cited in McCoach, 2002). Generally, Nunnally (1978) proposed 0.70 to be the minimum acceptable standard for internal consistency. The reliability coefficient was 0.82 for civic virtue, 0.74 for conscientious, 0.85 for altruism and 0.76 for courtesy. Hence, it can be concluded that these measures posses sufficient reliability.

6. Discussion and conclusion

The positive contribution of OCB to organizational performance is well acknowledged by the literatures (e.g., Castro et al., 2004; Podsakoff & Mackenzie, 1997; Emmerik & Euwema, 2007). However, understanding the importance of the dimensionality of OCB can be extremely useful for organizational behavior studies. Although the dimensionality of OCB has been studied in previous researches, no known researches have been found to empirically study the dimensionality of OCB in the Malaysia context. Hence, this study has added to the growing body of research in OCB by using a series of tests to test for validity and reliability of the constructs. Preliminary results demonstrated a valid (content, construct, convergent, disriminant and nomological) as well as reliable four dimension scale for measuring OCB.

This study has chosen large scale manufacturing companies' employees in Malaysia as respondents as there exists bidirectional relationship between supervisors and their subordinates. Currently, the manufacturing sector is considered as one of the cornerstone of Malaysia's economic diversification strategy. As revealed by Abdullah (1996), Malaysian managers are only familiar with one level of interaction; hence, it is time to learn through exposure to different work settings, social interaction, and observation of work related practices not only in intracultural levels, but at the intercultural levels, and cross-cultural levels.

This study starts by testing the 20 items from five dimensions of OCB as proposed by Organ (1988). Nonetheless, Bolino (1999) has argued that it is necessary to seek further insight into the topic given the high correlation among

some of its dimensions. In this research, it was found that only four dimensions of OCB, namely civic virtue, conscientious, altruism, and courtesy are capable of explaining sufficient variation in the construct being measured. Nonetheless sportsmanship was not found to be a valid dimension in Malaysia context. The result is not surprising as OCB may be referred as a general tendency to be cooperative within an organizational setting (LePine et al., 2002; Koster, 2007). In addition to that, previous researchers have demonstrated that "helping behavior" has a negative effect on organizational performance (Castro, 2004), hence it is not surprising to see that sportsmanship is not an important dimension in OCB, particularly in Malaysia. The results of this study show some interesting similarities and differences concerning the dimensionality of OCB. Thus, having a guide like the present study to follow can be very helpful to researchers in OCB related areas.

7. Limitations and future research

Although the study has provided sufficient insights into the studied dimensions of OCB, the results could not be generalized in view of the fact that all the variables were taken form the same source and there is a possibility of common methods variance. Thus, longitudinal studies are likely to provide a better insight into the dimensionality of OCB over a period of time. In addition, different cultural and international contexts may limit the generalizability of results. It is unclear whether the findings may have the same implications for OCB in different cultural environment as the values of the participants in this current study might not accurately represent the values of other countries'. Comparative studies across professions, cultures, and industries are needed in order to truly understand many of the constructs included in this study.

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Table 1. Factor analysis results for organizational citizenship behavior

Items	Component			
	Civic Virtue	Conscientious	Altruism	Courtesy
I eager to tell outsiders good news about the company	.769	.195	-.044	.199
I am willing to stand up to protect the reputation of the company	.765	.139	.005	-.007
I actively attends company meetings	.666	.205	.049	.227
I do not mind taking on new challenging assignments	.647	.162	.474	.149
I make constructive suggestions that can improve the operation of the company	.611	.381	.231	.090
I am willing to coordinate and communicate with colleagues	.102	.792	.185	.069
I take one's job seriously and rarely makes mistakes	.092	.675	.274	.294
I often arrives early and starts to work immediately	.326	.617	-.007	.241
I complies with company rules and procedures even when nobody watches and no evidence can be traced	.254	.562	.002	-.011
I avoid consuming a lot of time complaining about trivial matters*	.217	.546	.092	.333
I am willing to assist new colleagues to adjust to the work environment	-.053	.246	.779	.189
I am willing to help colleagues solve work-related problems	-.005	.422	.746	.242
I am willing to cover work assignment for colleagues when needed	.395	.109	.702	.138
I perform only required tasks*	.058	.344	-.563	.154
I try hard to self-study to increase the quality of work outputs*	.304	.395	.453	.078
I avoid taking actions that hurts others	.012	.168	.059	.842
I avoid hurting other people's right to common/shared resources (including clerical help, material, etc)	.209	.355	-.030	.723
I do not initiate actions before consulting with others that might be affected	.110	.086	.275	.670
I try to avoid creating problems for colleagues	.443	-.145	.367	.540
I avoid focusing on what's wrong with his/her situation*	.413	.178	-.007	.472
Percentage Variance (59.64%)	16.626	15.437	13.971	13.605
Eigenvalue	3.325	3.087	2.794	2.721

Note: Values below 0.3 are suppressed
    Items with * are not used in the further analysis due to low loading or cross loading

Table 2. Intercorrelations of the major constructs

	Civic Virtue	Conscientious	Altruism	Courtesy
Civic virtue	1.000			
Conscientious	0.528**	1.000		
Altruism	0.398**	0.391**	1.000	
Courtesy	0.475**	0.439**	0.427**	1.000

*p<0.05, **   p<0.01

Table 3. Results of the nomological validity test

	Civic Virtue	Conscientious	Altruism	Courtesy
Dependent				
Loyalty-Affect	.47**	.32**	.41**	.21*

**p< 0.01, *p< 0.05

Table 4. Reliability coefficients

Variable	Number of Items	Items Deleted	Cronbach Alpha
Civic virtue	4	-	0.82
Conscientious	6	2	0.74
Altruism	4	1	0.85
Courtesy	4	1	0.76

Table 5. Descriptive for the major constructs

Variable	Mean	Standard Deviation
Civic virtue	5.11	0.88
Conscientious	5.27	0.82
Altruism	5.69	0.85
Courtesy	5.48	0.77

Note: All items used a 7-point Likert scale with (1=Strongly disagree and 7=Strongly agree)

Individual Development Observation of Xi'an-Xianyang

in Regional Economic Integration

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Abstract

Utilizing the agglomeration growth theory in the regional economy development theory, this article observes and analyzes the general connotation, economic meaning, regional influence and local countermeasures for the regional economic integration in Shan'xi provincial Xi'an city and Xianyang city which are located in the western economic region of China from different views, and through the observing and exploring the individual development mode of the regional economic integration, the article is expected to offer possible theoretical support of the practices of international and domestic regional economic integration.

Keywords: Regional economy, Integration, Xi'an-Xianyang, Observation research

Since 1980s, the globalization of world economy and the integration of regional economy powerfully drive the quick development of global and regional economy. In the world, the America economy community guided by United States, the European Economic Community guided by European Union and the Asian Economy Community guided by China have obviously been formed three global economic centers, and Dollar, Euro and RMB have become three mainstream coins in the world. In China, three regions taking Yangtze River Delta, Pearl River Delta and Surrounding Bohai Zone as cores have obviously become three economic centers in China, which have been regarded as the dragon arteries of Chinese economic development. However, the mutual characters of these economy communities include that all economy communities spontaneously or un-spontaneously form the tendency of regional economic integration to different extents, and some regions such as European Union even successfully unify complex coins, and the more important is that in the region of economic integration, large agglomeration power intensively attracts resources, technologies and talents from surrounding countries or regions, and these regions will become the "locomotive" of the global and regional economic developments.

Utilizing relative principals of agglomeration growth in the regional economics, this article adopts the method of logic reasoning to analyze the observe the essential, connotation, economic meaning, regional influence and development countermeasures that Xi'an City and Xianyang City in CHIna west economic region implement economic integration.

1. Utilizing economic socialization and internationalization to understand the essential and connotation of regional economic individual Xi'an-Xianyang economic integration

There were profound dissertations about socialization in many subjects such as philosophy, education and psychology, but the subject which first used the word of "socialization" was sociology. Most of these subjects thought that the socialization was the result of society transition. However, to understand the development of Xi'an-Xianyang economic integration by the socialization and internationalization of economic living, we first should make clear the concrete contents of economic socialization and internationalization from the view of economics. Max and Engels had pointed out that if the bourgeois didn't change these limited production materials from individual to socialization, i.e. the mutual production materials used by numbers of people, they couldn't be changed to strong productivity. Domestic economists He, Liancheng and Li, Zhongmin who specially studied the development economics thought that the economic socialization included twp parts such as the socialization of productivity and the socialization of production relations, and it also could be concretely divided into four aspects including the socialization of production, the socialization of exchange, the socialization of distribution and the socialization of consumption, and they pointed out that the economic socialization was the process that the economic main body continually breached original borderlines of four aspects including production, exchange, distribution and consumption in the reproduction process and developed activities according to the standard with larger range, and it was a historical evolvement process. If this process exceeds the national boundaries, so the socializations among countries, or between nations and regions or among regions form the economic internationalization. From above dissertations, we can summarize two obvious opinions, i.e. the economic

socialization and internationalization possess the expansion of space in the exterior form, and they also possess the function to improve the regional productivity in interior nature and result.

After making clear the content and character of economic socialization and internationalization, we begin to observe some characters objectively possessed by the object what we should know, i.e. Xi'an-Xianyang economic integration. The integration of regional economy for Xi'an City and Xianyang City should directly be represented as a sort of transverse economic association because these two cities are two independent regions. And the dependence and adaptability between two regions are more obviously increased after the transverse association, so the flow of every region production factor will enter into a larger space, which will be represented as a sort of extension of space for the economic activities of relative regions. This sort of extension of space is a sort of optimized integration of production factors in larger range and space as viewed from the allocation of resource, and the optimized integration will further enhance the regional productivity. Therefore, the regional economic integration obviously possesses general characters of economic socialization and internationalization.

From the comparison and analysis of concrete contents and characters of economic socialization and internationalization and regional economic integration, we can see that, the regional economic integration objectively possesses general characters of economic socialization and internationalization, so concretely speaking, this sort of economic integration is that four aspects including production, exchange, distribution and consumption of Xi'an and Xianyang are further extended, and the economic activities of these two regions further expanded in space, and the regional economic activity develops and evolves from small range to large range. And the essential and connotation of this sort of evolvement are that the regional resource allocation is further optimized through extending and expanding the relative range and space of regional economic activities, and the productivity of the regional economic development is further enhanced through optimizing the resource allocation, and the total strength and development level of regional economy are further enhanced through enhancing regional productivity, and accordingly the socialization and internationalization degree of regional economy are enhanced from the whole.

2. Utilizing agglomeration growth theory to observe the economic meanings of regional economic individual Xi'an-Xianyang economic integration

Both Xi'an and Xianyang are located in Guanzhong Plain of Shan'xi provincial inland of China, and the distance between two cities is only 25 kilometers, and under the connection of traffic arteries such as national highway 45 and national highway 312 and Longhai railway, the peripheral distance of city planning has gone to 0. So, many questions occur, for example, which one will be profitable because of the economic integration of two cities? Is it Xi'an? Is it Xianyang? Is it the whole region of Xi'an and Xianyang? Is it other region?

Firstly, we use the core-periphery structure theory to analyze the relative economic meaning of Xi'an-Xianyang economic integration. Beyond the memory of men, especially since Zhou dynasty, Qin dynasty, Han dynasty and Tang dynasty, because of the regional advantage of near distance and same geography, the spontaneous civil free trades in Xi'an and Xianyang are not stopped all along. We can think that this sort of free trade happens in two regions where the most original market economy develops most actively regulated by the "visible hand" in Shan'xi. In modern times, the large improvement of traffic condition not only reduces the transportation cost, but enhances the economic efficiency, and the trade between two regions is more direct and frequent. In the dynasty of Qin, as the capital, Xianyang was not only the largest regional economic center of Shan'xi, but the political, economic and cultural center of China, and its economic development degree was difficult to be imagined by modern people. At that time, Xi'an was located in the periphery of this center, its flourish vision and economic development level was inferior to Xianyang. However, in the period of Han dynasty and Tang dynasty, the history was reversed tremendously, and Xi'an which was located in the periphery of Xianyang became the capital of the empire, and this change not only made Xi'an turn into the most developmental regional economic center in Shan'xi, but brought up that Xi'an became the political, economic and cultural center of China. Up to Zhenguan and Kaiyuan times in Tang dynasty, Xi'an had definitely become the worshipful place that various countries revered, and various countries in the world had regarded Xi'an as the international metropolis and international economic center. But at this time, Xianyang, the economic center of China in Qin dynasty, had become the peripheral city of Xi'an, and its flourish vision and economic development level were far from Xi'an, and had obviously broken up comparing with the city in the Qian dynasty, and the productivity had obviously reduced. Since that time, the position of Xi'an which is the regional economic center of Shan'xi has not changed all long, and Xianyang is still is the periphery of Xi'an. Up to now, as the provincial capital city of Shan'xi, Xi'an is the political, economic and cultural center of Shan'xi, and it is the big city, but Xianyang is a middle sized city which is located in the periphery of the big city, and its population quantity is inferior to 1/10 of Xi'an, its area is inferior to 1/4 of Xi'an, its comprehensive economic strength is inferior to 1/3 of Xi'an. For the comprehensive competence, Xi'an ranked the 35th position in Chinese inland cities, but Xianyang only ranked before the 200th position, and the scientific and technical strength of Xi'an ranked the 7th position, and Xianyang could not rank in the list. From above historical variance, we can see a sort of economic phenomenon, i.e. in the spontaneous function of the

market, if the region is located in the core position, its regional economy will grow quickly, and the development will be more active, but if the region is located in the periphery of the core, its economic growth will grow relatively slowly. As viewed from the productivity level, the distance from the regional economic center is farther, and the productivity per capita will be lower. For this economic phenomenon, economists Hall and Jones observed that the countries with high income centralized in the small industrial centers of the northern hemisphere, and with the increase of the distance from these industrial centers, the productivity per capita would gradually decrease. And this economic phenomenon is just one of the most universal situations in the economic agglomeration phenomena, i.e. the core-periphery structure. Through the interior economic rule of the core-periphery structure theory, we can open out that if only depending on the function of the market, in the free trades of Xi'an and Xianyang, the trade will be more active and the economic growth will be quicker because Xi'an is located in the core of the region, but Xianyang is located in the periphery of the regional center, so its trade and economy growths will be relatively slow, and its economic development will be limited by the periphery.

Secondly, we use the bi-regional economic theory to analyze the relative economic meaning of Xi'an-Xianyang economic integration. Though there are different learning views and different descriptions about bi-regional economic theory in the world, but the economic idea basically tends towards consistent. About thirty years ago, Kaldor thought that after two regions developed free trade, the region with more developed industry would fulfill the demands of the country in another region to the industrial products with cheaper price, and the result was that the industrial center of the other region would lose the market and graduate away. According to this theory, naturally, we will define Xi'an as the more developed region relative to Xianyang. But in fact, as the largest economic center in Shan'xi, undoubtedly, Xi'an assumed the functions of agglomeration and decentralization for products. From the lowest meaning of trade cost and the optimal selection of several relative regions, the demands of country and city to the industrial products are only mostly fulfilled from lower price in the more developed region, Xi'an. So, this sort of trade and communication will certainly form the effect that Xi'an with more developed industry serves as the first class trade market which scale economy degree is higher, and Xianyang with undeveloped industry will become into the second class trade market with relative lower scale economy degree. So, whether does the result of this sort of trade mean the industrial center of Xianyang will lose the market, even graduate away? For this opinion, the industrial development experience of Xianyang maybe can not fully prove. Here, we don't consider the exterior factors such as system, and we take the industrial estate which is located in the north side and south side of Renmin Road about 10 kilometers and possesses above 60% of industrial gross in Xianyang as the model to observe. In the past, there centralized tens factories in the domains of electron, textile, printing and dyeing, mechanical manufacturing which had ten thousands employees, and the textile factories occupied above 70%. And the place was the really meaningful "engine" for the economic growth of Xianyang, even for the development of the whole city ten years ago. But now, the factories here are gradually declining in deed, and the electric industry is not as good as the past, and the textile industry falls off, even individual factories implement close and bankruptcy, and the local government is roughly implementing the industrial move recombination and reconstruction plan. So, whether does this phenomenon completely prove Kaldor's theory of graduating away? Whatever the answer is yes or not, but this phenomenon at least completely opens out that in the free trade, Xianyang has not comparable advantage in the market, and the industrial comparable advantage and the fact that the fulfilling degree to the demand of regional industrial products of Xi'an are very obvious. If we want to use Kaldor's theory to more deeply analyze the free trade to Xi'an-Xianyang region, so we need acquire more facts from long-term and dynamic changes. About a half century ago, Gelsh thought that the production was inclined to those industrialized countries which had occupied the large domestic markets before the federation formed. For this learning idea, we can think that the production centralizes to one region, not only because this region is an industrialized region for the development of leading industry, but because this region occupies large market in the gross comparing with relative regions, though these relative regions have formed federation in economy and integration, even in the political system. Furthermore, if we regard Xi'an and Xianyang as two relatively independent industrialized nations, and regard the integration as the federation (in fact, they are not so complex, because there are not many factors such as coin, exchange rate and custom), so we can see that before the federation, because Xi'an is the capital of "Shan'xi United States" and its urban industrialized degree is higher than Xianyang, and it occupies large market, so after the federation, the centralization or agglomeration of production still makes for Xi'an. If Kaldor's opinion offers learning support for us to prove the relative economic meaning that Xi'an has the relative advantage and Xianyang has the relative disadvantage in the free trade before Xi'an-Xianyang economic integration, so Gelsh's opinion opens out the relative economic meaning that after Xi'an-Xianyang economic integration, Xi'an still occupies relative advantage in the agglomeration of industrial production.

Finally, we use the agglomeration growth theory to analyze the absolute economic meaning of Xi'an-Xianyang economic integration. The agglomeration growth theory attracts many economic experts and scholars to apply themselves to study it for a long time because of its very high learning values. Half a century ago, US economist Hirschman pointed out that we thought the economic flying-off would not occur in several regions, and once certain

region realized the economic flying-off, there would be a sort of strong power to centralize the economic growths surrounding the foundation point. Ten years ago, Freedman and Friedman observed that various reforms all occurred in the region which centralized enterprises and universities taking research and development as the objective, and the centralization of these special resources further strengthened the renovation and development ability of these regions. In recent years, regional economics master Masahisa Fujita and geographical economic master Jacques Francois Thisse deeply studied the relationship between the established model with the agglomeration growth, and they thought that the agglomeration and growth were promoted each other. From above theories, we can see that Hirschman put forward the opinion that the growth promoted the agglomeration, and Freedman and Friedman put forward the agglomeration accelerated growth, and Fujita and Thisse's studies not only affirmed former two opinions, but summarized and developed former two opinions. So we can obtain the absolute economic meaning of Xi'an-Xianyang economic integration is that the Xi'an-Xianyang economic integration will promote the economic growth of the whole region of Xi'an-Xianyang, and the economic growth of Xi'an-Xianyang will promote the deepening of Xi'an-Xianyang economic integration, because the integration is just a sort of economic agglomeration activity in space among regions or countries, and this sort of activity is leaded by man-made factor, i.e. the government. So we can clearly know the absolute economic meaning of Xi'an-Xianyang economic integration.

From above analysis, it seems that we can obtain thus conclusion, i.e. on the one hand, the core-periphery theory and the bi-regional theory tell us the relative economic meaning that Xianyang's low productivity per capita and production agglomeration degree comparing with Xi'an make against the economic growth, and on the other hand, the agglomeration growth theory also tell us the absolute economic meaning that the agglomeration function of integration will promote the whole regional economic growth of Xi'an-Xianyang. Obviously, this conclusion still has cross and thickness in the branch contents, at least its logic is not so strict. So, do problems occur in our ratiocination? Or does disputation occur in the learning theory? In fact, the reason is that our conclusion has not further such flexible relationship between advantage and disadvantage, i.e. the exterior growth produced by industrial centralization may achieve the Pareto optimum. Concretely speaking, when the economic development goes to centralization from decentralization, various inventions and innovations will develop with quicker speed. So, if the economic growth effect produced by industrial centralization is enough large, even for the people who are in the peripheral region, their living level will exceed the people who are in the regions with decentralized industries. We can see that when this opinion affirms the agglomeration growth theory, it also points out the condition of unfavorable regional economic growth for the peripheral region after the happening of economic agglomeration activity. That is to tell us the flexible relationship between the relative disadvantages of peripheral economic region with the advantages brought by the enough large effect of the whole regional economic growth. For the "enough large", we think that it is the economic increase speed of the whole region should exceed the economic increase speed of the peripheral region under the decentralization estate at least. Therefore, we can complete summarize the absolute economic meaning of Xi'an-Xianyang economic integration, i.e. though Xianyang is located in the periphery of the center of Xi'an, and its economic development is limited by low productivity per capita and industrial concentration degree, but with the continually deepening of economic integration degree which will promote the economic growth in the whole region enough fast, the economic growth of Xianyang will be quickened, and this enough quick increase speed will exceed the economic increase speed before Xi'an-Xianyang economic integration at least, and the absolute value of these two increase speeds is the flexibility of the growth speed of Xianyang. In the short term, Xianyang will not obtain large benefits from Xi'an-Xianyang economic integration, but in the long term, Xinayang will gradually benefit from Xi'an-Xianyang economic integration, and with the deepening of the integration degree, the function of agglomeration and decentralization functions of Xi'an-Xianyang region will be stronger and stronger, and the economic growth of this region will gradually quicken.

3. Using the unbalanced growth theory to predict the influence of Xi'an-Xianyang economic integration to Chinese regional economic distribution

Various human activities on the surface of the earth are always represented as a sort of spatial concentricity because of natural or humanism factors such as geography, climate, environment and history. For example, America, Europe, Asia, Africa and US states, Chinese province or municipality all possess spatial concentricity, and even in the primitive society which productivity is very undeveloped, our ancestral collection and hunting activities all presented the nature of community. And the spatial concentricity is very clear in animals and plants, i.e. the phenomena of "things of one kind come together".

However, as viewed from the economics, just the spatial concentricity forms different regional economies, and the developments of different regional economies create the human civilization today because of the existence of the agglomeration growth and cycle accumulation effect. Through further observation, we can find out that this sort of spontaneous or un-spontaneous spatial economic agglomeration activity also forms the descending distribution of global regional economy from north to south, and the descending distribution of Chinese regional economy from east to west according to the degree of productivity. This sort of descending and uneven production distribution makes the global regional economy present a sort of unbalanced moving estate. In the unbalanced movement of regional economy, on the

one hand, the developed regions are more developed, but on the other hand, the undeveloped regions are relative poorer. Xi'an and Xianyang are located in the west that the economy is relatively undeveloped in three economic regions including east, middle and west regions which are divided by economic and technological conditions in China. So what influences will be produced in this unbalanced movement for Xi'an and Xianyang which are located in the economic region after the implementation of economic integration? Or what influences will be brought by the agglomeration growth and cycle accumulation effect to Chinese three economic regions after economic integration?

First, for the comprehensive strength of city, at present, the production total value of these two cities has exceed 57% of the whole Shan'xi region, and the population quantity exceeds 5 million, and the urban areas achieve 370 square kilometer, and the local financial income has breached 11 billion Yuan, and farmer's pure income per capita has achieved 3100 Yuan, and the urban per capita disposable income has achieved 8640 Yuan. After integration, because the agglomeration growth and cycle accumulation effect will be obviously amplified, the economic gross, urban scale and comprehensive economic strength of two cities will be further strengthened. At the same time, with the connection of the light railway and underground between two cities and the continual integration of construction of urban planning, the Guanzhong Plain in Shan'xi certainly will be gradually forms a double composite and dense city system corresponding to super big city for the spatial confirmation, and the composite and dense double-core metropolis, Xi'an-Xianyang double-core metropolis, may become the first largest city in the middle and west of China. Further more, because of the repetitive functions of agglomeration and diffusion, so the Xi'an-Xianyang metropolis will be gradually developed to Guanzhong city group in the Guanzhong Plain with west Baoji city, east Weinan city and north Tongchuan city.

Second, for the city competences, it means the ability that one city possesses to drive the development of region, nation and even the world and create more social fortunes comparing with other cities in the foreign and domestic markets. It not only embodies the competitive ability of one city from the quality efficiency, but emphasizes the development potential and growth aftereffect of the city. The index system to measure it mainly includes the comprehensive economic strength, capital strength, opening degree, talent and science and technology level, management level, basic establishment and house. In 2005, Chinese Academy of Social Sciences ranked the competence of Chinese backland cities, and though the comprehensive competence of Xi'an and Xianyang respectively stood 25th and 200th, but they still had certain comparison advantages in middle and west cities, especially Xi'an not only listed No.1 in the west of China and No.2 in the middle of China, but listed in the seventh position in the whole China because of its abundant scientific and technological strengths. The data not only make us know the large development potential and growth aftereffect of Xi'an-Xianyang in Chinese economic regions, but make us clearer know that the strong scientific and technological competence of Xi'an with the absolute industrial advantages such as electron (the largest color kinescope and deflexion loop manufacturing base in the world), coal (only inferior to Binchang coal mine in the north of Shan'xi) will make Xi'an-Xianyang become into the middle and west high technology R&D and production center in China, and the strong scientific and technological strength of Xi'an will promote the gradual enhancements of innovational production ability, agglomeration growth ability and agglomeration decentralization function for Xi'an-Xianyang in reverse, and accordingly Xi'an-Xianyang metropolis may be the largest economic center in the west of China.

Finally, for the humanism and geographical factors, both Xi'an and Xianyang are thousand years of historical and cultural cities, and Xianyang was the capital of Chinese first feudal dynasty of Qin, and Xi'an was the capital of Han dynasty and Tang dynasty, and both cities have 3300 years' history, and they are the live proofs of ancient China and civilization, and their profound historical and cultural connotations are famous all along in the world. So as viewed from the historical meaning, Xi'an-Xianyang metropolis will perfect and enhance the communication center between Chinese and global ancient civilization and modern civilization. At the same time, Jingyang County which is 20 kilometers north from Xianyang is the geographical coordinate origin of China, so Xi'an-Xianyang metropolis is the real inland core city from the geographical meaning of China.

From above analysis, because of many beneficial factors such as comprehensive strength, competence, humanism and geography, Xi'an-Xianyang economic integration will produce following influences in Chinese three largest economic regions, i.e. gradually generating the Xi'an-Xianyang super metropolis in the west of China, developing and forming the western high technology R&D center and Chinese western economic center, perfecting and enhancing the communication center between Chinese and global ancient civilization and modern civilization, objectively being located as the core city in the inland of China.

4. Using the growth pole theory, the regional economic policy and the environmental economic theory to break the restricting factor of "enough large" in Fujita and Thisse's economic growth effect theory and realize the great dream to build Xi'an-Xianyang Economic Region as the fourth largest economic center of China

Though the total economic strength and competence of Xi'an-Xianyang occupy considerable advantages after economic integration, but because the Chinese three large economic centers which have formed large scale and possessed strong competences are all located in the east and south of China, under the agglomeration growth and cycle effect and the

regional economic unbalanced movement rule, the economic development of Xi'an-Xianyang region which is located in the periphery and far from three centers is relatively disadvantageous objectively. This sort of disadvantageous representation mainly includes low peripheral productivity per capita and weak urban agglomeration and diffusion function. So, after breaking this restricting factor, Xi'an-Xianyang economic region may become into the fourth largest economic center, and make contribution to develop western economy, reduce the economic difference between the west and the east and realize west people's great dream.

First, we must foster and develop the economic growth pole. The growth pole theory was first put forward by German economist F. Perroux, and its innovational ability could intensively drive the quick growth of regional economy and put up strong agglomeration and diffusion effect surrounding the economic growth pole, and accordingly it has become into the pillar theory for many countries and regions to solve many problems such as regional gap and social instability induced by regional economic unbalanced movement and dualistic economic market. So to forest and develop the growth pole can not only possess large practical meaning to drive regional economic quick growth and regional production distribution, but possess same practical meaning to overcome the restricting factors such as low peripheral productivity per capita and weak urban agglomeration and diffusion function. Some industries in the three largest industries of Xi'an-Xianyang not only have occupied comparison advantage in the market of China, even formed uniquely absolute advantage. For example, for the agriculture, the green fruit in Weibei Tableland and its fine production and export trade should be taken as the agricultural growth pole to enhance farmers' incomes, and for the industry, the aviation and other high technology R&D production should be taken as the growth pole of Xi'an-Xianyang industrialization and urbanization, and for the service industry, the developments of the exclusive terra-cotta warriors and horses of the Qin dynasty, the Yang Mausoleum of the Han dynasty, the Mao Mausoleum of the Han dynasty, the Zhao Mausoleum of the Tang dynasty, the Qian Mausoleum of the Tang dynasty and the Xianyang Palace of the Qin dynasty should be taken as the tour growth pole. And these growth poles and grow pole-axes and growth bands will produce chain effect in the region through interaction to form the growth pole region which will drive the quick development and flying-off of the whole Xi'an-Xianyang regional economy through their own agglomeration and diffusion effect, and establish certain speed base for the Xi'an-Xianyang region to realize being the fourth largest economic center.

Second, we must establish and perfect regional economic policies. The regional economic policy is also called as "visible hand", and it includes all public intervention behaviors that the central government aims for improving the geographical distribution of economic activities in one country. And its essential and motivation is to rectify some spatial results induced by the "invisible hand" (market mechanism) through "visible hand" (the public intervention of the government) and achieve the total two mutual associated aim including growth and regional balance. From 1950s to the late of 1970s, when the government of China constituted the national economic distribution strategies, it mainly implemented the national regional economic policies taking the balanced development of region as main objective as same as former Soviet Russia, Brazil and India, and the policy basically realized the relative balanced development between the economy of the middle and west of inland with the economy of the southeast littoral, and possessed certain political meanings to keep social stability and national security. Since the late of 1970s, under the drives of the economic globalization and the macro-policy of reform and opening, to establish export-oriented economy and extend the drive function of foreign trade in national economy, the regional economic policy objective of Chinese government also correspondingly changed to the national regional economic policy taking the priority development of region as main objective. After this policy was implemented, only in five years, four special economic zones had been established and 14 littoral opening cities were opened in about 1/4 national earth area, which largely stimulated the quick development of Chinese economy. At the same time, three large economic centers had been rapidly formed in the southeast of China, and these three centers have been regarded as the "dragon veins" and headspring of the inland economic development in China. However, the implementation of this policy also brought a series of difficult social problems such as reduced employment opportunities, slow income increase, the flow of high quality talents, and deficiency of local financial income in the west region of China. Though the administration was driving the strategy of the Development of the West Regions, but because of the macro huge complexity and the microcosmic long term nature of this strategy, Xi'an-Xianyang economic region will not be changed in the short term. To overcome the peripheral restricting factors surrounding these three centers and realize the great dream of the forth largest economic center of China, Xi'an-Xianyang local governments should apply the central government to further constitute more concrete and purposeful regional economic development assistance policies from various aspects including finance, revenue, investment and industry. Suppose that if the nation could establish Xianyang which is located in the periphery of Xi'an as the free trade region or special development zone or opening city of Chinese inland core according to international current rules after integration, so Xianyang certainly will implement organic integration with global modern civilization by its profound Qin cultural connotation and charm. At the same time, Shan'xi province should also strengthen various policy assistances from various aspects such as finance, revenue, investment and industry, promote the continual deepening of the degree of Xi'an-Xianyang economic integration, increase the agglomeration diffusion and

agglomeration increase ability of Xi'an-Xianyang metropolis, and accordingly the quick growth of the whole Shan'xi economy will be driven. In addition, because the Xi'an-Xianyang economic integration is a long term process, and it needs 10 years to 15 years at least, so Xi'an City and Xianyang City should apply Shan'xi Province to constitute "Xi'an-Xianyang economic integration statute", which will reduce the man-made administrational variable factors in this middle and long term layout, and increase the possibility making Xi'an-Xianyang economic region to form the fourth largest economic center of China.

More importantly, the system of environment economy accounting (SEEA) should be established. The influence of human activity is always the important problem concerning human health and long-term survival since the late of the twentieth century. On the one hand, people are more and more concerning the influences of human economic activities to global and local environment, and on the other hand, human more and more realize that the continual growth of economy and the human welfare all depend on the services provided by the environment. These services include offering the raw material and energies used in production goods and services, absorbing the castoffs produced in human activities, offering basic function in the life support and offering other amusements such as geographical sights. These attentions not only are translated into the questions whether the environment gifts are utilized responsibly, but become into the perfect basic problem of human sustainable development. From this view, though Xi'an-Xianyang government puts forward the objective of environment governance, and has begun to comprehensively govern a series of environments including industry, river, exhaust gas and floating dust, and two cities unite to create national civilization city, sanitation city and environment protection city together, but the human independence degree to economic welfare and environment and the quantitative illegibility of benign environment to promote economy and welfare and the phase and sudden nature of this establishment activity will induce that two cities reduce the ideal long-term emphasis degree and scientific implementation level to the sustainable development. So we must establish a sort of the account researching and analyze the interaction between the environment and economy essentially, and only to combine these two domains, we can test the meanings of different production and consumption mode to the sustainability, which is the SEEA what we need advocate and establish. SEEA is the latest scientific research result and international authoritative literature, which is issued by UN, Europe Committee, IMF, Organization for Economic Cooperation and Development (OECD), World Bank together, and if Xi'an City and Xianyang City first adopt SEEA and bring many problems such as resource consumption, environment protection and environment degeneration into national economic accounting, which could not only implement consistent scientific analysis for the contribution to the economy and the influence to the environment, but produce long-term and profound international influence to the economic integration of two cities. Furthermore, this independence of economy to the environment and the promotion function of benign environment to the economy also decide that we can not only depend on the economic mode to solve the problems of economic quick growth and restriction when we develop the economy. Or else, all economic activities made by people will hold a candle to the sun, and even the behavior that people disobey natural rule will finally reap as we have sown.

In this article, we put forward main theories and practical supports aiming at the objective restricting factors in the long term development of Xi'an-Xianyang economic integration. But in the short term, these two cities should establish scientific work mechanism to deepen the degree of economic integration, quicken the modernized degree of basic establishment taking the traffic as emphasis among regions, continually enhance the urban agglomeration and diffusion function, and accordingly establish necessary and objective base for realizing the dream being the fourth largest economic center in China.

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'Stakeholders' Perceptions of Corporate Social Responsibility:

Empirical Evidences from Iran

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"We never get what we wish" (Salehi, 2007).

Abstract

Corporate Social Responsibility (CSR) is very high on corporations' agenda in recent years. CSR means different things to different stakeholders but generally refers to saving people, communities and the environment way that goes beyond what is legally required of a firm. In such a position majority of stakeholders look for higher CSR. However, according to this survey there is an expectation gap between actual level of CSR and expected level from the viewpoint of stakeholders. In this survey the authors became to conclusion Iranian corporate sectors have very less CSR from the viewpoint of third parties. It not only damaged third parties confidence but corporate performance also.

Keywords: Corporate, Corporate Social Responsibility, Iran

1. Introduction

Since the 1970s, corporations have addressed business ethics in various ways, including the introduction of compliance programs and managers, the addition of board-level ethics committees, the development of codes of conduct, the preparation and dissemination of values statements, the hiring of corporate social responsibility and training programs of all kinds. However, profit seeking companies have been setting up operations in developing countries for numerous reasons, including cheaper labour, new opportunities, and access to resources, all for the ultimate objective of increasing profits. Unfortunately, many of these companies, especially in developing countries are not following ethical practices or conforming to labour or environmental standards, leading to a global response from concerned citizens (Kapstein, 2001; Cragg and Greenbaum, 2002).

Globalization has opened up new opportunities but it has also exposed the world to new risks. Companies are confronted with new dynamics since the linkages between the social, environmental, political and economic roles of businesses are increasing.

Mergers, deregulation and privatization have resulted in the creation of large corporations that in some cases have more economic power than sovereign countries. This has created a shift in responsibility and public expectations towards these corporations have grown.

The challenge for corporations is to maintain and/or increase profits and respond to the new societal expectations at the same time. Managing these two issues, which seem to contradict each other, requires the development and implementation of strategies that will have positive impacts for both the corporation and society. One way of linking

economics and social well being is through the development and implementation of CSR.

Carroll (1999) note, the CSR concept has had a long and diverse history in the academic literature. A general view of CSR is for companies to be accountable to their stakeholders. Stakeholders are generally employees, customers, suppliers, communities, etc. Corporate Social Responsibility activities can consist of being responsible to employees, by, for example, developing and implementing policies which improve working conditions for employees in the firm. CSR can also consist of being accountable to the community where the company operates, by, for example, volunteering company personnel to the community. CSR can also involve developing policies which are environmentally friendly, for example, setting up a recycling system. The broad understanding is that CSR has three principles which represent environmental, social and economic dimensions (Kingston and Wagner, 2004). The terminology for CSR also varies; some companies refer to it as corporate responsibility, social responsibility, corporate citizenship, sustainability, or sustainable development (Overton, 2004).

1.1 Definition of CSR:

CSR has emerged as the business issue of the 21st century and has been studied for over 50 years. To this day academics do not have a consensus on its definition (Wood, 1991; Carroll, 1991) and it has been frequently assigned to the field of business ethics and conduct.

Publications, definitions and references to CSR started as early as the 1950s. One of the pioneer books on the topic of CSR was written by Howard in 1953, titled the "Social Responsibilities of the Businessman". This was one of the pioneer books on social responsibility for businesses and highlighted a company's role beyond the financial benefits.

Common definition of the social responsibility of businessmen was "it refers to the obligations of businessmen to pursue those policies to make those decisions or to follow those lines of relation which are desirable in terms of the objectives and values of our society" (Carroll 1999:270).

One of the first writers of the 60s who defined CSR is Keith Davies. He argued that CSR refers to "the firm's consideration of, and response to, issues beyond the narrow economic, technical and legal requirements of the firm" (Davies 1973: 312). Frederick (1960) was also a major contributor to the emerging definition. He stated, "Social responsibility means that businessmen should oversee the operation of an economic system that fulfills the expectations of the people. And this means in turn that the economy's means of production should be employed in such a way that production and distribution should enhance total socio-economic welfare (Frederick 1960:60). Social responsibility in the final analysis implies a public posture toward society's economic and human resources and a willingness to see that those resources are used for broad social ends and not simply for the narrowly circumscribed interests of private persons and firms". The definitions of CSR in the 60s were an attempt to link society and businesses, defining society in the broadest terms. There was no specific relation to the ecology, environment, or community. In the 70s, the number of authors writing and making reference to CSR started to multiply. The idea and inclusion of stakeholders began to appear; Johnston (1971: 50) stated that "a socially responsible firm is one whose managerial staff balances a multiplicity of interests instead of striving only for larger profits for its stockholders. A responsible enterprise also takes into account employees, suppliers, dealers, local communities, and the nation". One of the most important contributions to the definition of CSR was made by the Committee for Economic Development (CED) in 1971, the CED articulated a triple concentric definition of social responsibility; "The inner circle includes the clear-cut basic responsibilities for the efficient execution of the economic function products, jobs, and economic growth. The intermediate circle encompasses responsibility to exercise his economic function with a sensitive awareness of changing social values and priorities: for example to environmental conservation, hiring and relations with employees, and more rigorous expectations of customers for information, fair treatment and protections from injury. "The outer circle outlines newly emerging and still amorphous responsibilities that business should assume to become more broadly involved in actively improving the social environment" Committee for Economic Development (CED 1971: 15). This definition provides a more integrated approach between the business and employees, society (again as a whole) and the environment. Eilbert and Parket (1973) introduced the concept of community in their CSR definition, using the term "neighborhood"; "perhaps the best way to understand social responsibility is to think of it as good neighborliness. The concept involves two phases. On the one hand, it means not doing things that spoil the neighborhood, on the other; it might be expressed as the voluntary assumption of the obligation to help solve neighborhood problems. Those who find neighborliness an awkward or coy concept may substitute the idea that social responsibility means the commitment of a business or business, in general, to an active role in the solution of broad social problems such as racial discrimination, pollution, transportation, or urban decay ". Carroll (1979) offered the following definition of CSR "The social responsibility of business encompasses the economic, legal, ethical, and discretionary (or philanthropic) expectation that society has of organizations at a given point in time". In the 80s and 90s there were fewer definitions but more efforts to measure and conduct research for the purpose of operationalizing CSR.

In an attempt to relate corporate social responsibility, responsiveness and business ethics, Epstein (1987) provided the following definition "CSR relates primarily to achieving outcomes from an organization's decisions concerning specific

issues or problems which by some normative standard have beneficial rather than adverse effects on pertinent corporate stakeholders. The normative correctness of the products of corporate action has been the main focus of CSR". He pointed out that the three concepts are closely related and overlap and introduced a new term "corporate social policy process" by merging together his definitions for corporate social responsiveness and business ethics. He stated "the nub of the corporate social policy process is the institutionalization within business organization of the following three elements; business ethics, corporate social responsibility and corporate social responsiveness".

CSR refers to a company's commitment to operate in an economically and environmentally sustainable manner, while acknowledging the interests of a variety of stakeholders and maximizing economic, social and environmental value. It is a holistic concept that can mean different things to different groups and stakeholders. Central to the operations is the belief that both businesses and individuals have responsibilities (Lee, 1997). It's about doing business in an economically, socially and environmentally responsible way - a way that involves all stakeholders including employees, customers and communities. CSR is determined by an organization's policy and continuous action in such areas as employee relations, diversity, community development, environment, international relationships, marketplace practices, fiscal responsibility and accountability. CSR isn't just about philanthropy and volunteerism. It's about having a mindset and a corporate culture that sees value in interacting with society above and beyond simply satisfying customers and shareholders. Some advocates of CSR prefer not to define the term, mentioning that it is more a process than a specific program (Kotter and Heskett, 1992). Another author defines CSR as the measure of a company's impacts on the quality of life of its stakeholders. Thus CSR is the sum of actions taken in the interest of society, the actions which have benefits both inside and outside a company (Bloom, 2003). CSR is based on "the legitimacy with society, public responsibility within the organization and managerial discretion by each individual with the organization" (Stanwick and Stanwick; 1998). According to Wilson (1997), the "role and responsibility of business extends well beyond the critical importance of wealth creation". He goes as far as saying that "a profitable business sector is vital to funding the standard of living and quality of life to which society aspires". McIntosh et al. (1998) asserts that businesses are socially responsible when they consider and act on the needs and demands of their different stakeholder groups. Finally the World Business Council on Sustainable Development (WBCSD) defines CSR as "The continuing commitment by business to behaving ethically and contributing to economic development while improving the quality of life of the workforce and their families as well as of the community and society at large" (Wawryk, 2003). At the other end of the spectrum of corporate responsibility are the more fundamentalist views of Friedman (1970) and Levitt (1983) who argue that business has only one responsibility and that is to make a profit for its shareholders. Any mission beyond this must be considered fraudulent on the part of the organization's managers. They also believe that corporations function to make a profit and governments should worry about social responsibility. This argument varies considerably with most of the literature and there have been wide criticisms and debates since Friedman published his comments.

Today, we are held to new standards for corporate citizenship, human rights, and the environment that are no less rigorous than the financial requirement of the investment in communities" (Williams 2002: 26). Considerable change has occurred since Friedman's comments. Society in general has become more demanding in the selection of products and services and in addition they demand that companies exercise moral judgment towards communities, societies and the environment. Friedman may have neglected to understand the change that was occurring at the time and failed to recognize that the move toward CSR was not a gimmick or temporary trend but a permanent cultural change in society.

Finally, American Petroleum Institute International Petroleum Industry Environmental Conservation Association API/IPIECA defines social responsibility specifically for the oil and gas industry "as the voluntary commitment by business to manage its activities in a responsible way. "Oil and gas companies aim to be active and responsible members of the communities in which they operate and to contribute to economic development while improving the quality of life" (2003).

1.2 Evolution in CSR

The emergence of accountability, governance, responsibility and transparency for the private sector has created different approaches to social responsibility and business conduct. In the era of President Johnson in the United States, the phrase "quality of life" was introduced and changed the whole significance of consumer products and consumerism. The notion of quality products, quality of working life and quality of the environment became issues for the public and corporations had to react to this new trend by introducing products that were safe. Certain business sectors such as nuclear power and tobacco started to be questioned. There was recognition of the need to have ecological, environmental, economical and social balance which meant that the private sector was seen as the actor to bring solutions to these consumer concerns. Companies started to create and publish new policies and expand internal training and communication programs to promote compliance. They started to lobby to influence public opinion and the government. Some companies initiated "catching-up" initiatives such as establishing equal employment opportunities for minorities. Large corporations began to go public about corporate social responsibilities and publish some of their efforts, but they also made public that "any approach to corporate responsibility must begin with the practical recognition that the corporation must be profitable

enough to provide shareholders a return that will encourage continuation of investment" (Wilson 2000: 12). More successful initiatives included the incorporation of social issues in the company's traditional annual reports. General Motors used a successful strategy in 1971 inviting educators and representatives of foundations and investment institutions to a conference to explain the progress made by General Motors in areas of public concern and obtain participants' comments.

However, it was not until the late 1970's that companies began to react more pro actively to corporate social responsibility issuing affirmative action guidelines, for example, for women's rights and including corporate social responsibility in strategic planning, which required companies to include all stakeholders, consumers, shareholders, employees, community and the general public. Some companies established board of directors' committees to deal with corporate responsibility issues. Others established staff groups to examine and raise questions related to these issues. The Business Roundtable documented some policy instruments introduced by companies, which included;

- A written code of conduct;

- Well-defined corporate policies with regard to such matters as executive compensation, fair pay, equal employment opportunity, personal privacy and freedom of expression;

- A continuing focus on corporate impact on the environment, health and safety in the workplace, and the impact of plant openings and closings on communities and employees;

- Written policy on disclosure;

- Continuing concern about product quality, acceptable pricing policies, and ethics in advertising, and

- A high priority for high level attention to the size and direction of corporate philanthropy.

2. Literature review

Societal expectations for businesses have developed over time and there have been periods where they have been more noticeable than others. Traditionally, corporations were viewed as a means of obtaining products, services and employment. Increasingly however, the public are demanding environmental and social benefits from corporations. Formal writing on CSR is a product of the 20th Century and references on the subject started as early as the 1930s, including Bernard's (1938) the Function of the Executive (Carroll, 1999).

In the 60s issues about minority rights, women's rights, consumerism, environmentalism, corporate support for the Vietnam War and other factors brought about a new cultural revolution in society. These developments initiated the corporate social responsibility movement.

Schumacher (1973) revolutionized the idea of development and global economics. As an economist he saw the link between society, environment and economics and presented unconventional theories for achieving improved quality of life for people. Schumacher said "The business man, as a private individual, may still be interested in other aspects of life - perhaps even in goodness, truth, and beauty - but as a business man he concerns himself only with profits". He challenged the conventional idea that the only responsibility of the enterprise is to make profits. The Corporate Social Responsibility movement was an early response to an article published in 1970 by Friedman stating that the "social responsibility of business is to increase its profits". This argument was in 1963 the owner transferred the control of the company to a collectivity and established socially responsible restrictions.

Schumacher's views of idealistic businesses is part of what we call today good business practice, corporate social responsibility, responsiveness, governance, business ethics and many other interrelated concepts. It is the movement which makes businesses more accountable and responsible for the quality of life of their stakeholders. In other words these concepts are not new and private enterprises throughout the world had been practicing them before governments began to institutionalize the concept.

The impetus for change is increasing through shifting social values, increasing consumer and shareholder activism, ease of technological communication, strengthening local and international citizen action, depleting natural resources, and a growing recognition that the benefits of globalization are not shared equally, mostly profiting the richer countries.

Wilson (2000) describes the paradigm shift of society's value as a "New Reformation", a reordering of public and private value systems, and sums it up as follows:

- From considerations of quantity (more) to considerations of quality (better);

- From the concept of independence, toward the concept of interdependence (of nations, institutions, individuals, and all natural species);

- From mastery over nature toward living in harmony with it;

- From competition toward cooperation;

- From the primacy of technical efficiency toward considerations of social justice and equity;

- From the dictates of organizational convenience toward the aspirations of self development in an organization's members;

- From authoritarianism toward participative management, and

- From uniformity and centralization toward diversity, decentralization, and pluralism (Wilson 2000; 8).

3. Research methodology

The main purpose of this study is to determine the actual level as well as expected level of various groups in Iran regarding different aspects of CSR. In addition, the study attempt to provide answers to following research questions:

RQ1: What is the perception of different groups in Iran about CSR?

RQ2: Is there any differences between actual level of CSR and expected level among respondents?

To provide clear answers to the research questions, a Five-Point Scale Likert questionnaire adopted from previous researches (Al-khater and Naser, 2003) in terms of "Strongly agree" to "strongly disagree". The questionnaire was distributed to the following groups in Iran: External auditors, internal auditors, accountants, bankers, investors, and academician. The selection of these groups was based on the random selection. These groups are also somehow companies' beneficiaries.

The questionnaire separated into two parts, namely the first part contains general information on the respondents, background profile and the second part of the questionnaire was related respondents' opinion about different aspects of CSR which actual it is existed as well as the expected levels of respondents groups. The second part was sub-divided into five areas for determining actual level of CSR which it is already practice in Iran as well as expected level from the viewpoint of respondents groups. This part was cover five areas namely; CSR towards customers, CSR towards employees, CSR towards suppliers, CSR towards broader community and CSR towards environment.

Table No.1 shows the number of questionnaires that were distributed, the number returned for each group, and the overall response rate.

Insert Table 1

The largest number of received questionnaire was academicians numbering 88 and they represented 88 per cent. Further, 80 percent of questionnaires were received by various respondents. The questionnaire sought information about the sample groups' gender, age and level of education. The vast majority of the respondents (82 per cent) were male. Out of cent percent 58 per cent were less than 35 years. A total of 71 per cent of the participants indicated that they hold a bachelor degree in accounting or related fields in contrast, 20 per cent of participants indicated that they hold a master degree in accounting or related fields. Only 9 per cent of the participants indicated that either they hold PhD or doing PhD in accounting or related fields.

3.1 Statistical Techniques

To analyzing data, descriptive statistics that include frequencies, mean and median were adopted. Further, to analyzing differences between actual level and expected level of various groups about different aspects of CSR Wilcoxon Test is employed.

Insert Table 2

Table 2 shows the results of perceptions of the respondents about CRS towards customers was assigned the mean value of 2.72 as against the expected mean value of 3.43 and there was an expectation gap of 0.71. The actual CRS was found to be moderately high with the mean value of 2.83 with regard to product safety and of 2.84 for fair marketing practices. The expectation gap was found to be highest with regard to product safety with the mean value of 3.52.

The test shows that there were significant differences between the actual and expected value of all the variables Z= 0.000 (<0.05).

Insert Table 3

CSR towards employees was tested in table 3 with five variables, viz., Equal opportunities, Health and safety; Performance towards local employees, Developing skills and Employment security. CSR towards employees was assigned the overall actual mean value of 3.16 and expected mean value stood at 3.42 resulting in an expectation gap of 0.26.

The test shows that there were significant differences between the actual and expected value of all the variables Z=0.000(<0.05) except employment security (>0.05).

Insert Table 4

CRS towards suppliers in table 4 was tested with four components consisting of Purchasing ethics, Preference towards local suppliers, Social consciousness and environmental consciousness. The actual and expected mean values at grand

mean level were moderately high with the values of 3.24 and 3.74 with an expectation gap of 0.5. The highest actual mean value and expected mean value with regard to the variable Environmental consciousness were 3.43 and 4.08 respectively.

The test shows that there were significant differences between the actual and expected value of all the variables Z= 0.000 (<0.05).

Table 5 presents the CSR towards broader community, which includes three variables. CSR towards broader community was assigned the actual mean grand mean value of 2.80 as against the expected mean value of 3.59 and expectation gap was found to be the mean value of 0.79.

Insert table 5

The highest expectation gap was found to be the Sustainability of community with the mean value difference of 0.93 as against the least expectation gap of 0.63 with regard to Community consultation. The test shows that there were significant differences between the actual and expected value of all the variables Z= 0.000 (<0.05).

Table 6 depicts the levels CSR towards environment the actual grand mean value stood at 2.90 and the expected grand mean value was 3.56 resulting in the expectation gap of 0.66.

Insert Table 6

The actual mean value of pollution was low at 2.83. The highest expectation gap was highlighted in urban renewal and the gap between actual expected mean values stood at 1.01. The least expectation gap was evidenced in energy usage and the gap between the mean values stood at 0.46. The test shows that there were significant difference between the actual and expected value of all the variables Z= 0.000 (<0.05).

4. Conclusions and remarks

CSR is important to various users of corporate information such as employees, customers, local community, and government and its agencies, pressure groups and society in whole (Al-khater and Naser, 2003). In this study, an attempt was made to investigate the actual levels as well as perception levels of various user groups in Iran regarding CSR. For user groups took part in the survey, namely, external auditors, internal auditors, accountants, bankers, investors and academician. According to this result almost in all statements there is a expectation gap between the actual level of CSR and expected level among the participants. The results of this survey show that Iranian corporate sectors had attention to CRS; however according to viewpoint of third parties it is very far from expected level. In addition, the authors become to conclusion that if such condition carried out by Iranian corporate sectors, it will create big problem not only to stakeholders' benefits but to corporate performance also. To solving such serious problem the Iranian legislators should force corporate sectors for following more corporate responsibilities at large scale.

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Table 1. Questionnaire Distributed Profile

Target Group	Distributed Questionnaire	Received Questionnaire	Response Rate (Percentage)
External auditors	100	82	82
Internal auditors	100	78	78
Accountants	100	72	72
Bankers	100	75	75
Investors	100	85	85
Academician	100	88	88
Total	600	480	80

Table 2. CSR towards customers

Sl. No.	Companies have responsibilities towards customers	Respondents	Status	Paired Samples Statistics		Paired Differences	Paired Samples Test	
				Mean	SD	Mean	Wilcoxon Test	Z*
1	Fair trading practices	480	A	2.58	1.06	-0.88	-14.961	0.000
			E	3.46	1.25			
2	Fair marketing practices	480	A	2.84	1.09	-0.65	-13.215	0.000
			E	3.49	1.26			
3	Product safety	480	A	2.83	1.14	-0.69	-13.154	0.000
			E	3.52	1.30			
4	Services	480	A	2.62	1.08	-0.63	-12.089	0.000
			E	3.25	1.31			
Grand mean			A	2.72		-0.71		
			E	3.43				

*Significance (2-tailed), Note: A=Actual, E=Expectation

Table 3. Companies' responsibilities towards employees

Sl. No.	Companies have responsibilities towards employees	Respondents	Status	Paired Samples Statistics		Paired Differences	Paired Samples Test	
				Mean	SD	Mean	Wilcoxon Test	Z*
1	Equal opportunities	480	A	3.24	1.384	-0.25	-5.062	0.000
			E	3.49	1.443			
2	Health and safety	480	A	3.28	1.361	-0.33	-11.423	0.000
			E	3.61	1.287			
3	Performance towards local employees	480	A	3.09	1.180	-0.49	-9.349	0.000
			E	3.58	1.162			
4	Developing skills	480	A	3.30	1.066	-0.34	-12.528	0.000
			E	3.64	1.161			
5	Employment security	480	A	2.89	1.155	0.09	-1.747	0.081
			E	2.80	1.388			
Grand mean			A	3.16		-0.26		
			E	3.42				

*Significance (2-tailed), Note: A=Actual, E=Expectation

Table 4. Companies' responsibilities towards suppliers

Sl. No.	Companies have responsibilities towards suppliers	Respondents	Status	Paired Samples Statistics		Paired Differences	Paired Samples Test	
				Mean	SD	Mean	Wilcoxon Test	Z*
1	Purchasing ethics	480	A	2.79	1.057	-0.6	-11.159	0.000
			E	3.39	1.309			
2	Preference towards local suppliers	480	A	3.38	1.250	-0.33	-4.512	0.000
			E	3.71	1.120			
3	Social consciousness	480	A	3.36	1.290	-0.43	-8.728	0.000
			E	3.79	1.099			
4	Environmental consciousness	480	A	3.43	1.251	-0.65	-13.342	0.000
			E	4.08	1.172			
Grand mean			A	3.24		-0.5		
			E	3.74				

*Significance (2-tailed), Note: A=Actual, E=Expectation

Table 5. CSR towards broader community

Sl. No.	Companies have responsibilities towards broader community	Respondents	Status	Paired Samples Statistics		Paired Differences	Paired Samples Test	
				Mean	SD	Mean	Wilcoxon Test	Z*
1	Sustainability of community	480	A	2.58	1.12	-0.93	-15.283	0.000
			E	3.51	1.37			
2	Community investment	480	A	2.83	1.21	-0.8	-14.702	0.000
			E	3.63	1.13			
3	Community consultation	480	A	3.00	1.08	-0.63	-11.887	0.000
			E	3.63	1.21			
Grand mean			A	2.80		-0.79		
			E	3.59				

*Significance (2-tailed), Note: A=Actual, E=Expectation

Table 6. CSR towards environment

Sl. No.	Companies have responsibilities towards the environment	Respondents	Status	Paired Samples Statistics		Paired Differences	Paired Samples Test	
				Mean	SD	Mean	Wilcoxon Test	Z*
1	Pollution	480	A	2.83	1.04	-0.58	-11.138	0.000
			E	3.41	1.18			
2	Energy usage	480	A	2.93	1.07	-0.46	-9.057	0.000
			E	3.39	1.23			
3	Use of non-renewable resources	480	A	2.97	1.17	-0.59	-11.670	0.000
			E	3.56	1.18			
4	Urban renewal	480	A	2.87	1.05	-1.01	-14.921	0.000
			E	3.88	1.54			
Grand mean			A	2.90		-0.66		
			E	3.56				

*Significance (2-tailed), Note: A=Actual, E=Expectation

Research on Technical Capacity Promotion
of Export-oriented Private Enterprises

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Abstract

How to evaluate the technical capacity of export-investment enterprises objectively, scientifically and effectively, it is valuable for export-oriented private enterprises to locate technology innovation goals themselves, develop implementation of technical innovation successfully, keep and enhance competitive advantage, and get the best economy and social benefits. On the basis of definition related, the article analyzes the status and issue of technical innovation of export-oriented private enterprises, researches the model of updating technical capacity deeply, and gives the appropriate measures in macro and micro level.

Keywords: Export-oriented, Technical capacity, Upgrade

How is the export-oriented private enterprise in long-time competition in the domestic and foreign markets with the process of Chinese economic reforms accelerating and meeting the need of international and domestic economic situation? It depends on the ability of transnational factors of production and technical advancement.

1. Concepts Related

Export-oriented enterprises mean export-oriented export enterprises whose basic production process based on domestic, commodity exchanging faced international market and it participated in international division of labor and international competition positively.

Private enterprises refer to economic organizations making profit which are set up or held by a natural person and based on employing.

Export-oriented private enterprise(Zhang, 2001, pp.23-25) is a business obtaining foreign exchange which is set up or held by a natural person, based on employing , taking the technical advancement as the backing and the international market as the guidance. It develops the international market by competitive products or service of high-quality and it enhances continuous competitive ability in the international market through conformity element of production to achieve an export-oriented technology and economic virtuous circle.

Technical capability refers that enterprise creates technology unique to get ability which is hard to imitate for outsiders and scarce by specific technical elements and skills or a unique combination.

2. Existing problems about technical innovation of the export-oriented private enterprises

With the need of reform, the development of Chinese technical innovation, especially export-oriented private enterprises, is a great progress. While generally speaking, business is not aware of knowledge, technology and talent. Most enterprises are also accustomed to ignore the changes in the mode of growth and there are more problems about innovation in technology upgrading, market adaptability and key technology.

2.1 Weak awareness of technical innovation

Because of limited funds and weak awareness of the role of technical capacity, technical capacity of most export-oriented private enterprises is weaker. They are also lack of core technology and easy to be imitated. (Zhang, 2001, pp.23-25).Addition, they only spend funds on sale strategy at the most time.

2.2 Technological innovation in small enterprises

The cost of technical development and R & D expenditure are important indicators which measure strength of technical

innovation. The international community generally believes that only R & D expenditures accounted for 2 percent of sales, enterprises can survive. And it reaches 5%, enterprises are competitive. (Zhang, 2001, pp.23-25).Compared with developed countries(an average of 2% to 3%), R & D expenditure of our country is lower than 1.5%.At the same time ,most businesses have not yet regarded the development of innovation through a developing thought. They fail to connect product innovation and technical innovation with economic efficiency and market competition. See Figure 1.

Insert Figure 1 Here

2.3 Incentive mechanism of technical innovation has not yet formed

Most export-oriented private enterprises don't deeply understand the relationship between technical advancement and competitive power. Addition, demanding of scientific and technical achievements is not strong. Though some need, they are unable to pay transfer fees. The result is enterprises can not rely on technical innovation to adapt to market competition.

3. Development model of the technical capacity

3.1 Model of independent innovation

Here, independent innovation model is a model which is based on project combination and the future improvement of technical capacity. (Mao, 2000, pp.4-6).This pattern has strong independence, high input, high risk and the slow process of technology accumulation. Therefore, the export-oriented private enterprises should have strong financial strength, strong research and development ability, knowledge accumulation and advantages in the colleague in this mode. See table 1.

3.2 Model of cooperation innovation

Judging from present situation of our country, export-oriented private enterprises are mostly small and medium scale. Their own resources and capacity of research and development are weak. So, this model is more suitable. Cooperation innovation model (Mao, 2000, pp.4-6) is based on mixed-mode technology of project combination. Therefore, an inevitable trend of technical innovation is to carrying on the independent research and development and the significant technical innovation by enterprise's division of labor and cooperation's way, realizing the resource sharing through the exterior technical resource's internalization. This model can shorten the time of innovation, enhance their competitiveness, reduce cost of innovation, and spread the risk and so on. It includes cooperation between enterprises and enterprises, enterprises and universities or research institutions, setting up research institutes and other forms. While, using this model, strong relevance of technology and knowledge, fusion of the knowledge accumulating, supporting each other of the technological innovation system between the two sides are essential. Such as table 1.

Insert Table 1 Here

4. Research on technical capacity promotion

4.1 Support of the government's policy

Experience proves that, export-oriented private enterprises' development can not be separated from the promotion of government's policies. This article holds a view that the government ought to carry on the incline a little to export-oriented private enterprises, create loose external environment, support in the direction and so on. These policies include the financial policy support, the fiscal charge policy support, government's macro guidance, and softening terms of obtaining import and export right.

4.2 Countermeasure of promoting themselves

If export-oriented private enterprises develop in the international market, the necessary condition is national policy supporting and the necessary and sufficient condition is the improvement of their own technical capacity .Including:

4.2.1 Raise awareness of enterprises

Effectively raise awareness of recognition of technical innovation and the role of developing core competitiveness. Enhance innovation vitality of enterprises to ensure technology of sustainable development achieve. (Jiao, 2005, pp. 23-25).

4.2.2 Introduction of advanced technology

Concentrate on "reverse" investment to high-tech enterprises. Export-oriented private enterprises need to accelerate the introduction of advanced technology. They can seize and explore the international market by purchasing technology and attracting foreign investment to form their own development.

4.2.3 Mergers and acquisitions

On the basis of their own resources, export-oriented private enterprises get external innovation resources through the way of mergers and acquisitions to achieve external resources internal. Its essence is to achieve optimum combination

of technical resources and realize independent innovation by property rights trading. Although costs and risks of this measure is higher, technical capacity of enterprises can be improved rapidly in a short time.

4.2.4 Make leading products as the center and develop a variety of technologies

When the leading products are well-selling in the market, enterprises should have a sense of crisis and develop products of the second or the third generation. When updating, guide the market with advanced technology (Yao, 2001, pp.36-39) and develop marketable products.

5. Conclusions

Developing export-oriented economy by the private enterprises is to meet the objective need of current international and domestic economic development. At present, because of weak ability of innovation and lack of technical advantages in overseas market, export-oriented private enterprises of our country are lack the stamina for development. Therefore, only establishing effective mechanisms of technical innovation and constantly improving their own technical innovation ability, export-oriented private enterprises can enhance core competitiveness and contribute for the sustainable development in the process of technology updating and adjustment of the national economy.

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Table 1. Conditions of different development model of the technical capacity

| conditions / model	To be qualified
Independent innovation	abundant fund
	strong capacity of researching and developing, some advantages
	rich accumulation of knowledge resources
	conformity different innovation resources effectively
Cooperation innovation	strong relevance of technology and knowledge between the two sides
	fusion of the knowledge accumulating between the two sides
	supporting each other of the technical innovation system between the two sides and so on
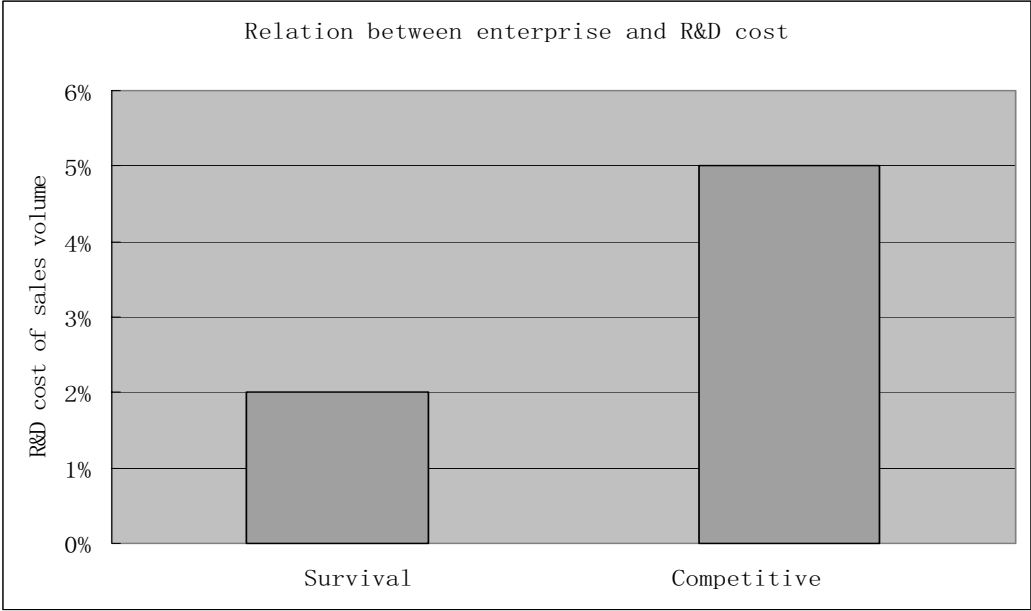
Figure 1. Relation between enterprise and R&D cost

Global Value Chains: A framework of Buyer-Supplier Management

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Abstract

Business clusters and global value chains (GVCs) command growing interest in some research disciplines. In the existing literature overwhelmingly focus on two niches: governance and upgrading. The detailed mechanisms of buyer-supplier relationship management tend to remain under-researched.   This paper presents a framework base on the literature on the literature of International Marketing and Purchasing (IMP) group through a dyadic study of buyer-supplier relationship on GVC context.

Keywords: Global value chains, Business clusters, IMP, Buyer-supplier relationship

1. Introduction

In the recent two decades, business clusters have generated much excitement both academics and policy makers. A significant aspect of contemporary research concentration is the relationship between firms in the cluster and global buyers. The value chain approach offers a way for forward in analyzing such external linkages, connecting global market nodes (Gereffi, 1994). GVC has indicated how global linkages play a crucial role to enhance the ability of learning and innovation and access to high-tech knowledge (Humphrey and Schmitz, 2002a). Global value chains provide opportunities and challenges for business development in the developing countries. Generally speaking, the current research field of GVCs overwhelmingly concentrates on two basic niches: governance and upgrading. Such studies have provide a framework that is relevant on both the analysis and a depth understanding of how the third world fashion development strategies to climb up a higher value niches in the global economy. On the one hand, they can bring access to overseas markets, particularly developed world's market. On the other hand, entry to the value chain may be dependent on supplying low value products as low cost and a willingness to maintain at this level of activity.

Nevertheless, the existing literature tends of focus on a buyer or supplier perspective without considering the transaction between the two parties holistically. From the perspective of buyer-supplier dyad, the IMP (Industrial Marketing and Purchasing) group's studies are an exception that will be a theoretical framework to integrating the GVC literature to explore the buyer-supplier relationship.

This study paper goes beyond the existing tendency to discuss differences in global value chains using stereotypical typologies. These typologies typically differentiate 3-5 typed chains and draw generation about their characteristics of significance. One of significant weakness of the literature is that the role of global buyers' characteristics has been little explored beyond Gereffi's (1994) categorization of either buyer or driven commodity chains, with the respective forms of governance. In contrast, this study will disaggregate global buyers into a wider range of business types.

This paper is organized as follows. In the next section I will present a critical review on governance and upgrading in the GVC literature. Section 3 I outline a framework of analysis by adopting IMP literature into GVC context. Section 4 summarizes and concludes.

2. Existing GVC literature: governance and upgrading

Since the 1990s, the successful stories of the business clusters in the North, particularly in the Third Italy, has stimulated a attention to the potential provided by this model of industrial organization for the South. Business can be regarded as a major facilitating factor for a number of subsequent advantages, e.g. the emergence of a complicated network of clustered firm, and the appearance of trade association, the occurrence of organizations who sell to national or international markets. To capture the positive impacts of these elements on the competitiveness of clustered firms, the external economies are of significance in indicating the advantages of business clusters, but there is also a deliberate force work at work from local external economies (unplanned action) to consciously pursued joint action planned action

(Schmitz, 1999). Based on an analytical point of view, the chain approach is helpful due to the fact the concentrates changes from manufacturing only to the multiple business activities conducted in the supply of products and services. The concentration of GVCs is on the essence of the relationship among the diversified factors linked to the value chains, and on the implications for growth (Humphrey and Schmitz, 2002b). To research these issues, 'governance' and 'upgrading' are central to focus.

The definition of 'governance' is firstly introduced by Gereffi (1994), defined as "authority and power relationship that determine how financial, material, and human resources are allocated and follow within a chain" (p.97). Governance is now central in GVC literature. Recent efforts on GVC governance have paid much attention rather than original contribution on non-hierarchical governance forms. A set of strategic parameters can be highlighted as characterizing governance types: 'what' or 'how' a product/service should be produced as well as 'when', 'how much' and even 'at the price'. Drawing upon these parameters, Humphrey and Schmitz (2000) distinguish three possible types of governance: network, quasi-hierarchy and hierarchy. In the context of 'network' governance, there are relationships that encourage enterprises with complementary which jointly establish the key parameters. Within this governance, the term is frequently used to denote some form of co-operation between 'equal'. Regarding other two types of governances, there are relationships characterized by a remark asymmetry of competence and power distribution between lead firms and subordinate firms in the chain. A quasi-hierarchy governance can be explained that the lead firms tend to specify what is to be produced, how it is to produced and how the firm performance is to be monitored. They argue this type of governance is common to exist in developing countries. In most of cases, the global buyers act as lead firms. More importantly, Humphrey and Schmitz (2000) also suggest that global buyers tend to disclose their core competencies to local suppliers.

The concept of upgrading has been often used by the literature on competitiveness (Kaplinsky & Readman, 2001; Porter, 1990). Various recent studies explain the difference between the "high" and the "low road" to competitiveness with the capability of firms to upgrade (Humphrey & Schmitz, 2000a; Kaplinsky & Readman, 2001; Meyer-Stamer & Seibel, 2001; Pietrobelli & Rabellotti, 2002). All these studies share the same sense of urgency calling for sustained upgrading of business clusters in low economies. The majority of the literature discusses a hierarchy or upgrading path (e.g. Gereffi, 1999), which begins with the upgrading of process and product, then moves to functional upgrading and last of all, to competitiveness. In line with the present approach, Humphrey and Schmitz (2000b) discuss the prospects of upgrading with respect to the pattern of value chain governance. They conclude that insertion in a quasi-hierarchical chain offers very favourable conditions for process and product upgrading, but hinders functional upgrading; networks offer ideal upgrading conditions, but they are the least likely to occur for developing country producers.

The previous literature mainly focuses on two niches: governance and upgrading. The GVC literature on governance and upgrading has offered a framework that is not only relevant on the analysis of firms, but also to an understanding of how countries fashion development strategies to attempt to move themselves into relatively high value, sustainable niches in the global economy. However, a number of issues still need to address(Gereffi, 2001). According to the literature above, two significant research opportunities can be identified in this study.

- The scope of global buyers
- A holistic study on the management of buyer-supplier relationships

2.1 The scope of global buyers

With regard to the issue on the scope of global buyers, the existing literature has been explored beyond Gereffi's (1994) categorization of buyer-driven and producer-driven commodity chains, with their forms of governance. It is partly due to the unfinished work of global commodity chains and the angle of GCC governance. That is, the current literature on GVC and subsequent literature on GVC overwhelming concentrate on buyer-driven chains. Such literature usually focused attention on the powerful role that large retailers, such as Wal-Mart, and highly successful branded merchandisers, such as Nike, have come to play in the governance of global production and distribution (Sturgeon, 2006). In this study, I will identify such kind of global buyers as specialized buyers.

One of contribution of this study is to claim the heterogeneity in global value chains may significantly affect the way the relationship with local suppliers. As the discussed above, global buyers in this literature refer to giant discount chains, department stores, supermarkets, and brand marketer (so-called manufacturers without factories). The role of global buyers has been exaggerated due to this scope of global buyers. Sonobe and Otsuka (2006, p17) that "we do not believe, however, that superior production and management capacities were acquired by Asian entrepreneurs primarily from global buyers". In this respect, we completely concur with Humphrey and Schmitz (2004) that the firms which were most successful in functional upgrading and exporting new markets sere companies which had acquired their design and marketing experience in the national market. From the perspective of the theory of product lift cycle, one research analyzes that the process in which small local producers acquire production and product technologies and develop marketing capacities so as to grow large and eventually become able to export some of their products to

advance countries, and these local producers learn a great deal of advance technological ideas and management know-how from foreign joint ventures (Sonobe & Otsuka, 2006). Since this study does not cover product life cycle, I can not go further in this literature.   In this study, I will extend the scope of global buyers (see figure 1):

  (i) Specialized buyers, including to giant discount chains, department stores, supermarkets, and brand marketer, which have been intensively studied by the literature. They may embed into local supplier, an establishment of representative office in supplying county; or without any representatives in supplying county.

(ii) MNC buyers refer to subsidiaries of MNCs which purchase goods from the host county. None of studies makes explicit reference to this issue.

In this study, I will work on such two streams of global buyers as developed above (Figure 6). The impacts of two distinguishing types of global buyers on buyer-supplier relationship management also explore.

2.2 A holistic study on the management of buyer-supplier relationships

With reference to the role of global buyers, the empirical GVC literature (e.g. Humphrey and Schmitz, 2000) argue that captive or quasi-hierarchy governance is most common in developing countries. This type of governance is characterized by the significant dependence of small suppliers on large buyers for advanced production, methods, the design of products and marketing. Local producers have to face several obstacles when dealing with external sources of knowledge because of power asymmetries. The definition of quasi-hierarchy is confirmed by a number of other studies (e.g. Bazan and Navas-Aleman, 2004) showing global buyers are playing as 'lead firm'. The evidence presented is useful to single out the main regularities in GVC patterns of governance, but it has not given enough consideration on the role of producers in GVC context.   That is, it cannot be assumed that the specific governance structure is the only determinant of the leaders' inherent ability or interest to help local producers to upgrading themselves.   Some factors beyond governance structure are needed to further study. Nevertheless, and with a high dose of determinism, in the literature it argued that upgrading of firms in a value chain depending on governance pattern and power asymmetries among various actors within the chain. However,   although Humphrey and Schmitz (2000) and Gereffi et al (2005) claim that a more dynamic approach suggests that chain governance is not given forever and may change, the most existing GVC literature in low income economies still tends to explore business upgrading activities in quasi-hierarchy governance. This partly leads to an overwhelming focus on the role of global buyers, with a lack of exploration on the side of local producers (suppliers). To some extent, the literature tends to focus on one side of the relationship, overwhelmingly emphasizing buyer perspective, without considering the transaction between the two parties holistically.

In sum, whatever the role played by leader (supporters or obstacles to local producers' upgrading), technology and knowledge transmission and their effectiveness often appear as exogenous to the local firms involved. That is, they would be either determined by the leaders strategies (i.e. GVC governance) or by other forces like for example, the degree of trust between buyers and suppliers, reliability (absorption capabilities of local producers). To what extent, according to the international management literature, the management of buyer-supplier relationship is critical for business success (Wilson, 1995). Regarding to the existing literature in GVC context whatever what kind of governance structures they are, buyer-supplier relationship is poorly explored by the GVC literature. For example, the level of the firm, firms relationship and the differences in buyer-supplier relationship and individual characteristics tend to be overshadowed. All these elements should be combined within a framework where firm-level dimensions as well as include in order to explain how within GVCs upgrading occur in the situations of involvement of both buyer and supplier.

Due to the fact that the theory of GVC governance and upgrading originally stem from the case studies, they tend to fail to address the issues on firm level. For example, the existing literature will fail to answer the question and the like as follows:

- Why do firms in the same industry and cluster demonstrate starkly different approaches to brining their products to global markets; or

- Under the same governance structure, why some firms can upgrade into global value chains; some are not able to do that? What factors beyond the governance context determine this?

When discussing heterogeneous resources, possessed by two parties in a buyer-supplier relationship, the issue of interaction becomes crucial. The parties interact in order to make the best out of both their own resource, and sustaining a good relationship between them. The IMP group developed since the end 1970s has provided a widely accepted way of holistic dyadic approach that will be followed in this study.

3. IMP: A theoretical framework to integrate e GVC literature

A total of 23 years ago, the first output form the International Marketing and Purchasing(IMP) group challenged some of the basic ideas of business marketing (Ha°kansson, 1982). The approach in that book has been adopted by many

researchers and had led to a large number of research studies and doctoral theses and found its way into many books, managerial seminars and consultancy projects. The major benefits of the IMP approach interrelationships between the buyer and the supplier form the perspective of both parties when they interact. Thus this holistic dyadic approach has provided an extremely comprehensive descriptive account of the nature of business relationships.

The IMP approach contends the interactions between buyers and suppliers are shard by "environmental factors", which neither party to the exchange can directly control. This involves such aspects as market structure; dynamism; internationalization; channel position; and, social system (figure 6). The IMP approach contends, however, that, there are some elements of the interaction that buyers and suppliers can influence. Remarkably, one of the major benefits of this approach is its inclusiveness.

Framework can be an in-depth firm-level investigation of buyer-supplier dyad based on four cluster cases. Following the previous experience on IMP literature, two questionnaires can be produced: either for supplier or for buyer.

Three existing papers have summarized the factors influencing buyer-supplier relationships (Barnes et al, 2007; Power & Reagan, 2007; Wilson, 1995).   Wilson (1995) identifies 13 factors including successful buyer-supplier relationships, while another 13 factors also concluded by Power & Regan (2007). Barnes et al (2007) produce a conceptual framework based on four relationships dimensions: legitimacy and compatibility; social relationships; economic bonds and shared values; and learning bonds. Based on the summary of influencing factors from these three papers as well as upgrading literature in GVC context, 22 items are identified as the main focus for this investigation of dyadic relationship in GVC context (see table 1). These 22 supporting items are classified into 2 groups of dimensions and 4 sub-dimensions. That, is, these four dimensions can be divided into two categories: invisible (including legitimacy and compatibility, social relations and share values) and visible variables (economic and learning bonds). The invisible variables may exist in the 'atmosphere', which never been explored by the GVC literature.   The visible variables will contribute the upgrading issues on GVC literature from the perspective of the management of buyer-supplier relationship.

4. Conclusion

Global value chains represent a new form of industrial organization that is widely diffused in many industries across countries. Therefore, an analysis of its potential implications and consequences for firms in developing countries is of utmost relevance. However, recent research efforts in this direction have not fully clarified how global value chains foster innovation and learning processes in developing countries' firms. On the one hand, it has often been hinted that entering GVCs causes a sharp and automatic impact, either positive or negative, on local producers, in a deterministic fashion. On the other hand, the research agenda has shifted to the analysis of how local firms can join value chains, and on the influence of governance structures on upgrading.

This article provides theoretical and practical guidance on ways of managing business relationships from both the commercial and operational perspective of buyers and the suppliers. Existing literature tends of focus on a buyer or supplier perspective without considering the transaction between the two parties holistically.   From the perspective of buyer-supplier dyad, the IMP (Industrial Marketing and Purchasing) group's studies are an exception that will be a theoretical framework to integrating the GVC literature to explore the buyer-supplier relationship.

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Table 1. 22 variables of 4 dimensions for exploring the buyer-supplier relationship in GVC context

Dimensions	Variables
legitimacy and compatibility	Trust; Reliability; Mutuality; Brand image (quality); Reputation (quality)
Social relations	Closeness; Social circles; Communication; Friendship
share values	Relationship depth; Win-win; Affection
economic and learning bonds	Staff exchange; Training; Co-design; Exchange of information; Joint research; Quality control practices; Professional contacts; Integrated IT; Ownership; Switching costs

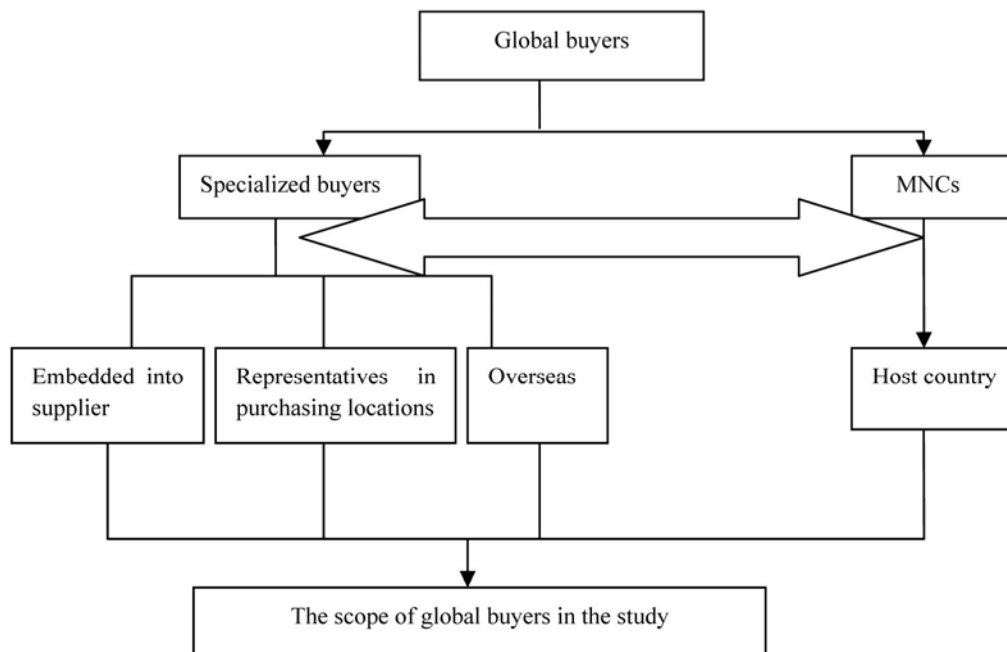Source: based on Barnes et al, (2007); Power & Reagan, (2007); Wilson, (1995).

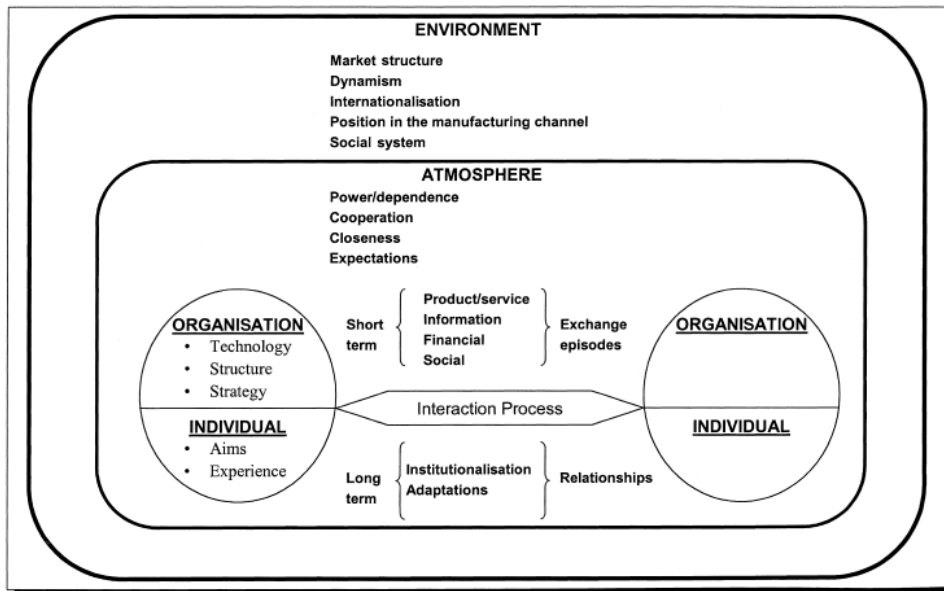Figure 1. The scope of global buyers

Source: author's design

Figure 2. The IMP interaction model

Source: adapted from Ford, (1990)

The Tacit Knowledge-sharing Strategy Analysis

in the Project Work

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Abstract

With the era of knowledge-based economy, the process of "The conversion of knowledge to effective" has become more important in the implementation of the project. Knowledge management emphasizes on innovation and sharing, Knowledge-sharing, in particular the sharing of tacit knowledge is an important component of the knowledge management. This article is therefore particularly for the tacit knowledge of the free flow and sharing in projects put forward some suggestions.

Keywords: Tacit knowledge, Tacit knowledge-sharing, Project

In today's society, the competitiveness of enterprises is paid more attention to its innovation and emergency ability. Knowledge management is a knowledge-based economy in the background, to contemporary information technology-based, is focused on the development and utilization, accumulation and innovation, to help people share information. Therefore, knowledge sharing is an important component of the knowledge management. It is the only way to play the effectiveness of knowledge, realize the value of knowledge. Academic circles believes that tacit knowledge is often greater than the potential of explicit knowledge, can be on the tacit knowledge and guide the development and utilization, will be the development of society, especially the development of enterprises have a strong role.

Tacit knowledge is personal and hard to formalize, thus making it difficult to communicate or share, One of Polanyi's famous aphorisms is: "We know more than we can tell." Polanyi(1996) also insisted that tacit knowledge is the basis of creativity. For tacit knowledge to be communicated, it must be converted into words, models, or numbers that anyone can understand. Effective transfer of tacit knowledge generally requires extensive personal contact and trust.

In project work context the significance of tacit knowledge has probably not yet been sufficiently understood. Project characteristics, the responsibility of the project manager is much important than it's power, because the people in the project come from different departments, the relationship is still attached to the original units, dedicated to a specific purpose or objective, so the project leader for the management of their difficulties and do not have enough incentive and a means of punishment measurement. The fact that a great deal of the know-how required, for example, in an engineering project is tied to knowledge that is not written in documents but realized through the expertise and understanding of the project personnel, is not taken into consideration as a whole. Also the fact that projects often last only for short time periods, which means that project people must continuously change their work situations, is not taken well into account. So the sharing of the tacit knowledge in the project is even more difficult than to achieve.

Perhaps the most important step toward the tacit knowledge of individuals and the project teams is to allow it to flow from the pull of emotional commitment and deep personal involvement. From a practical standpoint, however, individuals must have some form of strategic guidance so that they can align their creative energies with the goals of the firm.

Therefore, the challenge for project managers is to how to inspire, guide, excite, encourage, and shape, without

imposing arbitrary structure that might destroy the tacit knowledge flow in the project. This study gives some advices to the project manager on how to promote the tacit knowledge transferring and sharing in the projects better.

1. Build a working environment for the tacit knowledge sharing

A key to tacit knowledge acquisition and sharing in a project is access to a wide range of project's activities, to ideas of the other people, to information, and to opportunities for participation. In the opinion of Ruuska(1999)over half of project management problems result, entirely or in part, from poorly handled interactions. Thus, we can conclude that knowledge within a project and the ways of perceiving it is revealed through interaction.

1.1 An open-plan office is an appropriate room for a project team to work together

Face-to-face interaction is considered the richest medium because its capacity for immediate feedback and the availability of multiple cues, it enhances the use of tacit knowledge in the projects. we can conclude that the creation of shared understanding in the project is not only about the processing of objective information but it requires that subjective attitudes, views, intuitions and inklings of the individual team members are presented, tested and adapted for use. These subjective views and intuitions are mainly acquired and transferred by informal face-to-face interaction.

1.2 Provide a place for staff to communication and interaction in order to enhance the tacit knowledge exchanges between the staff

J.E Orr (p.140–169.) reported that members exchange ideas and share narratives in informal settings, thereby building a shared understanding out of conflicting and confusing information. Some companies set up a restaurant with the tall chair, gymnasium, café room, table tennis room, and other places of entertainment. In these places no formal rules to encourage dialogue between members. This problem has been studied previously (Desouza, Kevin C 2003 p. 63-74) most team members whose company established the entertainment places had said they felt that they exchanged or received job-related information

1.3 IT technology can facilitate communication between employees

Tacit knowledge exchange among team members could be enhanced through use of information technology, such as electronic networks and group support systems. In these settings individuals exchange knowledge via e-mail, online discussion, chat sessions, listservers, and thus in computer-mediated and group decision support systems(GDSS). And the video conferencing tools in place can even help people face-to-face Communication to promote knowledge sharing between employees an effective means.

So that the team members can exchange with each other, continue dialogue and for promoting reflection. Members of the team through dialogue and discussion to stimulate a new point of view (just as Brainstorming), their information will be stored together, from different angles and look for the end to unify different views, to form a new collective wisdom.

2. Establish the tacit knowledge-sharing culture in the project

2.1 To give the team's full confidence, and allowed the failure in the course of the R&D process in the project cycle

Give teams a clear message of their importance, uniqueness, and potential for success. And the project manager should allow the teams members failed during the course of the research and development, and should encourage the members understand the failure enough. In this way the members can find a better reason to solve problems in a variety way, such as the tacit knowledge sharing with other team members.

2.2 Trust in relation to project team mind and collective action is a particularly important issue

Trust ties together an attentive system, which forms the collective. Mind required for reliable performance. People in project team deal with each other more as roles than as individuals. Trust is based on expectations and is therefore formed in the consciousness of project team members (Meyerson D, Weick KE, and Kramer RM, 1996). Individual as a person and not simply as a project resource with work experience. Thus, trust has an indirect effect on the accessibility and efficient transfer of tacit knowledge. We can conclude that trust develops only with time as the result of project team's interpersonal relations within their shared situational ties.

3. Establish the organizational structure in favor of the organizational structure

3.1 The flat organizational structure as far as

Flat organizational structure just as the velcro structure(Lin. Zhao-wen,2006), The relationship of the project manager and project team members is the "employer-employee", that is, during the project cycle team members employed by the project manager. In the project cycle, the project manager command and assessment the members, they are only responsible for project manager, In other words during the project cycle the project manager is the "boss".

3.2 Establish a learning organization

3.2.1 A learning organization focused on creating a relaxed, for the atmosphere of learning and exchange, and fixed learning system, such as the Organization of regular training will help staff to communicate and share tacit knowledge is conducive to business innovation.

3.2.2 The Learning Organization can facilitate to let the knowledge and experience will be able to complement each other's employees together to jointly conduct research and development, focus and accelerate the commercial exploitation of knowledge.

3.2.3 Learning Organization can continue to absorb new information and new knowledge; at any time in order to adjust the direction and the ability to adapt to the market will help enterprises enhance their ability to adapt to the environment.

4. Establish an effective incentive mechanism

In order to encourage the sharing of tacit knowledge of individuals, enterprises should be targeted to the formulation of a number of incentives to promote the sharing of tacit knowledge can contribute to the staff to give encouragement. When employees are aware of the tacit knowledge-sharing for its own benefit, they will be happy to share their knowledge. In this study we focused on the spiritual inspiration for the role of tacit knowledge sharing.

4.1 Fully authorized by the incentive mechanism

Fully authorized to the stuff can let the stuff meet the pursuit of success and self-fulfilling psychological needs. The stuff can accord their own characteristics in the enterprise to find a foothold for the best, to seek the best space for itself-development. To maximize their potential to make the play, in order to better dedicate their own tacit knowledge. Therefore, to achieve the purpose of encouraging.

4.2 Use the psychological hint

The psychological hint which is for the future career goal to be given is also a good way of incentives. For example, if the commitment to knowledge holders the successful implementation of knowledge-sharing, will bring its series of interest, in particular the professional development priorities, and so on.

4.3 The establishment of more effective performance evaluation system

In staff performance appraisal time manager should focus on the number of useful knowledge which he transfers to the colleagues, the role of her work in his team, and his innovative contribution, and so on, rather than to take this knowledge of the absolute amount as a standard, and it can not influence the success or failure of its work.

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Optimal Combination of Trading Rules Using Neural Networks

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Abstract

A large number of trading rules based on technical analysis of prices are being used by investing community for generating trading signals for short term investments. As profitability of these trading rules vary, it is not easy to judge which particular rule really 'works'. Instead of a single trading rule, combination of rules are likely to offer the portfolio benefits of better risk adjusted return and hence, an experiment is carried out to combine signals generated from of moving averages of different window size using an artificial neural network. It is observed that the risk adjusted performance measure of the artificial neural network based trading model is better than that of simple 'Buy and Hold' strategy.

Keywords: Trading Rules, Technical Analysis, Neural Networks

1. Introduction

The investors not only look for long term capital gains from the market, but also like to maximize returns exploiting opportunities from short term price movements. A large number of trading rules based on technical analysis of prices are used for generating buy and sell signal for short term investments. From the numerous trading rules being used by the trading community, it is not easy to judge which particular rule really 'works'.

Investment professionals with long years of experience may take very good trading decision form their expertise. But there is no guarantee that such decisions will always work and therefore the use of a systematic procedure to generate trading decisions becomes important. A systematic decision making approach can also help to overcome various limitations that are inherent in human professionals. Further, as different practitioners have different views on the same information set, systematic evaluation methods will reduce personal bias. In the area of investment management, where decisions involve very large amounts of money, sometimes the lifelong savings of the clients, reassurance of the soundness of the investment decision-making process is necessary.

Technical trading rules are increasingly being used in financial markets for over a century ever since it was popularized by Charles Dow in 1900. But analysis of trading rules have started drawing more attention in 1990s and several authors have expressed that financial prices and returns are predictable to some extent, either from their own past or from some other publicly available information. For example, Bessembinder & Chan (1995), Blume, Easley & O.hara (1994), Brock, Lakonishok & Lebaron (1992), Ramazan (1998), Jegadeesh & Titman (1993, 2000), Lo & MacKinlay (1988), Neftci (1991), Ready (1997) test various trading rules based on technical analysis and reported that technical analysis provides information beyond that already incorporated in the current price. However, there cannot be a fixed trading rule as excessive usage of a particular trading rule will reduce efficacy of that rule. If everybody starts using a particular rule, that rule will not work any more and hence, the trading rules need to be continuously upgraded based on changing market dynamics.

Analyses made the literature are based on performance of a specific trading rule used in isolation. Instead of relying on a single trading rule, traders often use a variety of trading rules and sometimes a combination. Combining of rules are likely to offer the portfolio benefits of better risk adjusted return. Markowitz (1952, 1959) has shown that in portfolio context unsystematic risk can be reduced by diversification; possibly similar benefit arises when multiple trading rules are combined for taking a trading decision.

2. Using Moving Averages for Generating Trading Signal

The moving average (MA) method is one of the most widely used methods of generating trading rules. It includes numeral versions and different levels of complexity. A moving average is an average of observations from several

consecutive time periods. To compute a moving average sequence, we compute successive averages of a given number of consecutive observations. The objective underlying the MA method is to smooth out seasonal variation in the data.

The most widely used moving average (MA) is the *n*-day simple MA given by: $SMA_t = \frac{1}{n} \sum_{i=t-n+1}^{t} P_i$, where SMA_t is the

simple *n*-day moving average at period *t* and P_i is the closing price for period *i*. In the simple MA procedure, a buy signal is generated when the closing price rises above the MA and a sell signal is generated when the closing price falls below the MA. If there is a clear trend, this method will work well. If, however, the market move sideways or if there is excessive volatility, there will be a lot of false signals.

A modification of simple moving average is exponential moving average (*EMA*) that gives more weight to the most recent time periods. It is described recursively as: $EMA_t = \alpha.P_t + (1-\alpha).EMA_{t-1}$, where α is a value between 0 and 1.

For example, if α = 0.5, the most recent value P_t is given 50% weight and all other past values are given remaining 50% weight. When the computation begins, the current price is set to *EMA* and as more prices are available, the averaging process is continued.

$$EMA_1 = P_1$$
$$EMA_2 = \alpha.P_2 + (1-\alpha).EMA_1$$
$$EMA_3 = \alpha.P_3 + (1-\alpha).EMA_2$$

The exponential moving average performs well for many business applications, usually producing results superior to the moving average. (Krantardzic, 2001)

A moving average summarizes the recent past data, further; spotting the change in the trend of data may additionally improve forecasting performances. Some of the measures that compare current price with the moving averages are

$P_t - MA_t$:   the difference between the current price and its moving average;

$MA_t - MA_{(t-k)}$: the differences between two moving averages, of same window size;

$MA_{(t,n)} - MA_{(t,m)}$: the differences between two moving averages, of different window size; and

$\dfrac{P_t}{MA_t}$:   the ratio between the current value and its moving average.

In the present study the current price will be compared with its moving average in ratio format. When   current price P_t is be more than its Moving average MA_t, it is considered as an indication of uptrend and a buy signal is generated and vice versa a sell signal is generated when current price is less than its moving average. Numerically, the ratio $\dfrac{P_t}{MA_t} > 1$

will generate a buy signal and the ratio $\dfrac{P_t}{MA_t} < 1$ will generate a sell signal.

The value of the ratio $\dfrac{P_t}{MA_t}$ will nevertheless depend on the window size of the moving average. A moving average

having less window size, say 3 days, will follow current price closely and the ratio $\dfrac{P_t}{MA_t}$ will change from 'more than

1' to 'less than 1' more frequently generating a large number of buy and sell trading signals. Whereas a moving average having a large window size, 'say 200 days' will generate trading signal less frequently. More trading arising out of less window size may capture the minor movements of prices well, but consequently the transaction costs will also increase. The success of a moving average based trading method clearly depends on selection of a proper window size, but there is no known method to determine the window size. Therefore, an experiment is carried out to combine signals generated from of moving averages of different window size using an artificial neural network.

3. An Introduction to Artificial Neural Network

The artificial neural network based techniques are an information processing model derived from functioning of human brain. This is a simple information processing device that accepts many inputs, combines them, and produces an output. The basic element of a neural network is a neuron. The output of one neuron becomes input to other neurons. A neural network is a structure of many such neurons connected in a systematic way. In the study, the neural networks used are feed-forward neural networks, where information processing moves only in forward direction as shown in figure -1.

The neurons in the network are arranged in layers. Typically, there is one layer for input neurons (the input layer), one or more layers of internal processing units (the hidden layers), and one layer for output neurons (the output layer). Each layer is either partly or fully interconnected to the preceding layer and the following layer.

The connections between neurons have weights associated with them, which determine the strength of influence of a neuron to other neurons. Information flows from the input layer through the hidden processing layer(s) to the final output layer to generate predictions.   The connection weights are determined by a training process, wherein known input and known output data is fed to the network. The network adjusts connected weights so that a relationship between inputs and outputs can be established with certain degree of accuracy.

3.1 Designing of Network Structure

There are many parameters to design a feed forward neural network. Decisions regarding number of inputs in the input layer, number of hidden layers and number of neurons in the hidden layers, interconnection of neurons among layers etc. are to be taken. Though some techniques are mentioned in literature for determining these parameters, there is no uniformity. Structure of the network largely remains a design issue and leaves ample scope of innovation to the analyst.

3.1.1 Input Layer

The input layer to the neural network is the medium through which the inputs are presented to the neural network. When a set of input is presented to the input later of the neural network, the inputs are processed and resultant information is passed to the subsequent layer(s). Every input neuron should represent some known variable that has an influence over the output of the neural network. As final output will depend on inputs introduced to the network, the quality and relevance inputs are very important.

3.1.2 Hidden Layers

There are really two decisions to be made with regards to the hidden layers. The first is how many hidden layers to have in the neural network and then how many neurons will be in each of these layers. Neural networks with two or more hidden layers can represent functions with any kind and hence there is no theoretical reason to use neural networks with any more than two hidden layers.

Deciding the number of hidden neurons in layers is an important part of deciding the overall neural network structure. Hidden layers do not directly interact with the external environment but influences the final output. Hence, both the number of hidden layers and number of neurons in each of these hidden layers must be carefully designed. Using lesser number of neurons in the hidden layers will result in under-fitting. Under-fitting occurs when few neurons in the hidden layers are unable detect relationships is complex scenario. On the contrary, using too many neurons in the hidden layers may result in over-fitting. Over-fitting occurs when the neural network has so much information processing capacity that the limited amount of information contained in the training set is not enough to train all of the neurons in the hidden layers. Another problem can occur even when training dataset is very large. A large number of neurons in the hidden layers can increase the training time of the network. Over-fitting with large training data may fit past data very well. The objective of neural network model is to extract general relationship in the data which can be used in new environment. Thus generalization of network relations is more important than over-fitting.

There are few rule-of-thumb methods for deciding structure of hidden layer. These rules-of-thumb are only starting points to consider the initial structure. Ultimately the selection of the architecture of the neural network has to be finalized by experimentation.

- The number of neurons should be in the range between the size of the input layer and the size of the output layer.
- The number of neurons may be 2/3 of the input layer size, plus the size of the output layer.
- The number of neurons should be less than twice the input layer size.

In the present study, a three layered network with: one input layer having three input nodes, one hidden layer having three processing nodes and finally one output layer producing a single output is used, as shown in figure 1. The structure of the network can indeed be varied as per requirement of the analysis.

3.1.3 Output Layer

The output layer of the neural network presents output to the external environment. The output is derived from inputs via complex relationships inbuilt in the neural network structure.

3.2 Input-Output Relationships

Data ranges of real-world input parameters vary widely. For example, one variable may have data that ranges between 0 and 1, while another variable can be a five digit value. If both of the variables are used in their natural scale, the second variable is likely to be given much more weight in the model than the first variable, simply because of its original values (and therefore the differences between records). To compensate for this effect of scale, range fields are usually

transformed so that they all have the same scale. In the study, range fields are made uniform to have values between -0.50 and +0.5 by using a rescaled sigmoid function.

The activation of each neuron from input later to hidden layer and again from hidden layer to output layer is calculated as $a_j = f(\sum_i w_{ij} x_i)$, where a_j is the activation of neuron j, i is the set of neurons in the preceding layer, w_{ij} is the weight of the connection between neuron i and neuron j, x_i is the output of neuron i, $f(x)$ is a transfer function used to scale the summation values from -0.5 to +0.5. In the study, we used sigmoid or logistic transfer function to scale the numerical values. The original formula for sigmoid conversion is $f_{SIGMOID}(x) = \dfrac{1}{1 + e^{-x}}$ which converts any x value within a range of 0 to 1. The sigmoid values are further rescaled by a deducting 0.5 so that values remain within -0.5 to + 0.5. Thus the conversion function is $f(x) = \dfrac{1}{1 + e^{-x}} - 0.5$.

In the network used (figure -1), x_1, x_2 and x_3 are the input nodes, y_1, y_2 and y_3 are nodes in the hidden layer and z is the final output. The activation of each node in hidden layer is calculated by using following rescaled sigmoid function of weighted inputs.

$y_i = \dfrac{1}{1 + e^{-\sum (w_{ij}.x_j)_i}} - 0.5$, where w_{ij} is the connection weights between y_i and x_j nodes. Similarly, the final output z can be estimated using the transformation: $z = \dfrac{1}{1 + e^{-\sum (w_{ij}.y_j)_i}} - 0.5$.

The final value (z) is used for generating trading signal. Values of these rescaled sigmoid functions range between -0.5 and +0.5 with mean value of 0. If the value of z is found positive, it is considered as a signal of uptrend and conversely, when the value of z is negative it is taken as a signal of down trend. If buy, hold and sell decisions are represented by +1, 0 and -1 respectively, then final buy and sell decisions are determined using the value of Sign(z). Sign(.) determines the sign of a number: returns 1 if the number is positive, zero (0) if the number is 0, and -1 if the number is negative.

3.3 Training

The output value z can be calculated from the inputs (x_i) and connection weights w_{ij} using relationships mentioned in previous section. The values of x_i (inputs) are known to us but the values of connection weights (w_{ij}) are not known. The training the network is carried out to find out values of w_{ij}, so that these values can be used for generating future signals. The objective is to forecast output $z_{(t+1)}$, which will match with future actual return $r_{(t+1)}$. However the future returns can never be accurately predicted and any prediction will always have some error. The purpose is to minimize these errors as much as possible so that the forecast is of some practical use. The total error can be measured by adding absolute errors of each observation ABS($r_{(t+1)} - z_{(t+1)}$). A more acceptable form is based on minimization of Total Squared Error (TSE): Minimize: $\Sigma (r_{(t+1)} - z_{(t+1)})^2$

The minimization can be done using any commercially available software. In the study, the optimization was carried out using "Solver" add-in available in Microsoft Excel. Solver uses the Generalized Reduced Gradient (GRG2) nonlinear optimization code developed by Leon Lasdon, University of Texas at Austin, and Allan Waren, Cleveland State University. When Solver reaches an acceptable solution, it has minimized the total squared error term TSE by changing value of specified cells (these cells are weights w_{ij} of the network). The values of changed cells are the optimized weights and can be used in predicting trading signals in future.

4. Empirical Testing

4.1 Data

The study examines the profitability of technical trading rules applied to three Indian Stock Indices for the period 1st April 1998 to 31st December 2007, covering a period of 10 years. The daily closing values of following indices are analyzed in the study (details on these indices can be obtained from www.nseindia.co.in).

- S&P CNX Nifty
- CNX Nifty Junior
- CNX Defty

4.2 Converting Indices data to Network Inputs

Inputs to the network must contain information pertaining to output (to predict price movements). A large number of academic studies support usefulness of moving averages for determining trends in stock price series. The following inputs selected in the study compares current price with past moving averages.

- The first input compares closing price of the security with its 3 day moving average :

- $x_1 = (p_t$ / Moving average of past 3 days)
- The second input compares closing price of the security with its 7 day moving average:
- $x_2 = (p_t$ / Moving average of past 7 days)
- The third input compares closing price of the security with its 30 day moving average:
- $x_3 = (p_t$ / Moving average of past 30 days)

4.3 Finding Value of Network Weights

Training of network refers to a method of determining the value of connecting weights of the network based on a certain performance measure, such as cumulative profit. The performance of the trading systems is usually determined by optimizing over past known data, but there is no consensus on how much past data to be used. A common procedure to assess the profitability of technical trading is to choose the optimal parameter using the first part of the available data and then test the parameter upon the remaining data for out-of-sample verification. Out-of-sample verification is an important factor in testing the performance of technical trading strategies due to the danger of data snooping biases.

For each financial series, the training procedure is carried out using the past one year's data. The network weights (w_{ij}), that have shown the best performance over a year, are used for the out-of-sample trading in the next year. At the end of the next year, new optimal weights for the year are again calculated, and this procedure is repeated during the rest of the sample period. For example, the connection weights used for the year 2000-01 are trained weights that generated the highest cumulative return in the year 1999-00. The new connection weights for 2001-02 are selected using the data for the year 2000-01, and so forth. This procedure ensures that the entire neural network model is adaptive and all the trading results are out-of-sample.

4.4 Estimation of Profit (Loss)

Profitability of a trading position depends on the change of market price of the traded security and the position of the trader (either long or short). If trader has taken a long position, he will be benefited by a price rise of the security but will incur loss by a price decrease. Similarly the trader can make profit in a declining market by taking a short position. The trader is presumed to take a long position whenever the network output $z_{(t+1)}$ gives a positive value. Likewise, a short position is taken whenever the value of $z_{(t+1)}$ is negative. The trading decision can be represented by the following dummy variable.

$$d_{(t+1)} = \begin{cases} 1, & \text{if } z_{(t+1)} > 0 \\ d_{(t)}, & \text{if } z_{(t+1)} = 0 \\ -1, & \text{if } z_{(t+1)} < 0 \end{cases}$$

The dummy variable $d_{(t+1)}$ is equal to one (negative one) when the trader goes long (short) in traded asset. The return of the trader on a particular day can be estimated as follows:

$r_{(t+1)} = d_{(t+1)}$ ($P_{(t+1)} - P_{(t)}$), where, $r_{(t+1)}$ denotes the return of the trader resulting from the decision taken ($d_{(t+1)}$) at the close of period t, which depends on value of $d_{(t+1)}$ and change in the asset value within period t and (t+1).

When $d_{(t+1)} = d_{(t)}$, the existing position (long/short position in the asset) is maintained and no new transaction need to be carried out. Hence transaction cost is not applicable. If $d_{(t+1)} \neq d_{(t)}$, then the position held is reversed at the close of period (t+1), necessitating two single transaction (closing existing position and opening a new position in opposite direction). Taking transaction cost into account, daily gross profit becomes:

$$r_{(t+1)} = d_{(t+1)} \ (P_{(t+1)} - P_{(t)}) - c \ | d_{(t+1)} - d_{(t)} | P_{(t)},$$

where c is transaction cost (in fraction of asset value) of a single transaction and $| d_{(t+1)} - d_{(t)} |$ denotes absolute value of the difference $d_{(t+1)} - d_{(t)}$. Total cumulative profit after transaction costs can be obtained adding daily profits.

About 15 years ago, transaction costs in Indian markets used to be very high. But the scenario is changed now. Brokerage rates on Indian bourses have crashed to historic lows due to competition. Apart from competition, sustained reforms in the financial markets have led to lower transaction cost. Brokers can no longer justify higher transaction cost after introduction screen based trading, electronic transfer of shares through depositories, launch of internet driven trading and substantial increase of trading volume. The brokerage rates in the market during the period have plummeted from around 2% for delivery bases transactions to less than 0.05% of turnover for future trades. All profitability calculation in the study is carried out at 0.05% transaction cost analogous to cost applicable in futures market.

4.5 Trading Profits

The trading results of using Neural Network model is calculated for these three financial series and the same are compared with the profitability of Buy and Hold strategy. In Buy and Hold Strategy, the security is bought at the start of the study period and sold at the end of the period. No transaction is carried out during the period and no transaction cost is incurred. Whereas in trading model using neural networks, transactions were many causing high transaction cost. The

profitability of Neural Network model is compared with Buy & Hold strategy for the selected three series. The results are given in tables 1, 2 & 3.

It may be seen from the tables that total net profit using Neural Network Model is generally higher than that of Buy and Hold Strategy even after transaction costs indicating usefulness of technical trading rules.

4.6 Statistical tests

The most widely used risk adjusted investment performance measure is developed by Prof. William F. Sharpe; his measure is not only widely used in academia but also by market practitioners.

The Sharpe Ratio (SR) can be calculated as follows.

$$SR = \frac{\mu(r_i) - r_f}{\sigma_i}$$

Where r_i is the return over period i,   is the mean and   is the sample standard deviation over the n periods observed and r_f is the risk-free rate of interest. Originally, the benchmark for the Sharpe Ratio was taken to be a risk-less security, where the differential return is equal to the excess return of the fund over a one-period risk-less rate of interest. The usefulness of the Sharpe Ratio is based on the premise that a differential return represents the result of a zero-investment strategy. But in case of trading in a forward or future contract, one need not finance the asset by making full payment, often such contracts can be purchased by providing a small margin payment or providing some short of guarantee. Therefore traded contracts of stock index futures can be considered as zero-investment strategies.

Sharpe ratio in zero-investment strategies can be calculated omitting risk free rate as follows.

$$SR = \frac{\mu(r_i)}{\sigma_i}$$

The Sharpe ratio of an investment can be compared with any benchmark by computing the Sharpe Ratio for the benchmark and compare with the investment model. The Sharpe Ratio of Neural Network model and Buy and Hold Strategy are compared for the three financial series in Tables 4, 5 and 6.

In the tables, it can be found that Sharpe Ratio of Neural Network model is higher than that of Buy and Hold Strategy in most of the cases indicating that the model has given better risk adjusted return. The Sharpe Ratio is also directly related to the t-statistic for measuring the statistical significance of the return. The Sharpe Ratio, when multiplied by the square root of 'n' (the number of returns used for the calculation) is equivalent to t-statistic.

$$t_{value} = \frac{\mu(r_i)}{\sigma_i} . \sqrt{n}$$

$$t_{value} = SR . \sqrt{n}$$

The t-statistic as defined above for the full financial series is calculated in table -7. Since t-statistics of all the three financial series are not only positive in but also statistically significant at 1% level, use of the artificial neural network based trading model may be considered as a better alternative to Buy and Hold Strategy.

5. Conclusion

In the study, investment decisions were taken using technical analysis based trading rules and tested on three stock index series in Indian stock market. Instead of relying on a single trading rule, the rules are combined using an artificial neural network model. The theoretical profits from the model are estimated and compared with profits obtainable from "Buy and Hold" strategy. It is observed that the risk-adjusted performance of the Neural Network based trading model is generally better than Buy and Hold strategy.

Like many previous studies, the present study also demonstrates that it is possible to earn positive return by using technical trading rules. However one of the major impediments of trading profit is transaction cost. The study is carried out taking a relatively low transaction cost of 0.05%, usually applicable for futures trading where trades are squared off without delivery. Wherever the delivery is involved, the brokerage fees are significantly higher. Thus investor has to pay more attention in minimizing transaction cost for trading success. In the study, only moving averages are used as inputs to the network. Many other indicators; both technical analysis indicators and fundamental analysis ratios can also be used as inputs to the artificial neural network model to improve the investment performance. Configuration of the neural network model and node relationships can also be altered for further development.

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Table 1. Comparing profits of Neural Network model and Buy and hold strategy (For Nifty)

Year	No of Trading Days	Gross Profit	Transaction per Year	Transaction Cost	Net Profit	Profit from Buy-Hold Strategy
1998-1999	251	253	88	42	211	-87
1999-2000	254	-237	114	77	-314	471
2000-2001	251	1011	68	46	965	-397
2001-2002	247	308	80	44	265	1
2002-2003	251	243	96	50	192	-155
2003-2004	254	646	70	55	591	835
2004-2005	253	924	56	48	876	248
2005-2006	251	1124	60	75	1050	1406
2006-2007	249	826	68	118	708	160
2007-2008	250	3071	72	180	2890	1101
1999-2008	2511	8170	772	735	7435	3584

Table 2. Comparing profits of Neural Network model and Buy and hold strategy (For Junior-Nifty)

Year	No of Trading Days	Gross Profit	Transaction per Year	Transaction Cost	Net Profit	Profit from Buy-Hold Strategy
1998-1999	251	565	92	70	495	671
1999-2000	254	2445	86	125	2320	1433
2000-2001	251	2474	76	96	2378	-1970
2001-2002	247	748	70	49	699	64
2002-2003	251	509	82	60	449	-329
2003-2004	254	2231	66	79	2152	2205
2004-2005	253	2989	68	122	2867	868
2005-2006	251	2903	68	173	2730	2202
2006-2007	249	2351	88	287	2065	38
2007-2008	250	8252	68	331	7921	1394
1999-2008	2511	25468	764	1392	24076	6575

Table 3. Comparing profits of Neural Network model and Buy and hold strategy (For Defty)

Year	No of Trading Days	Gross Profit	Transaction per Year	Transaction Cost	Net Profit	Profit from Buy-Hold Strategy
1998-1999	251	394	158	61	332	-141
1999-2000	254	-147	190	104	-251	346
2000-2001	251	753	140	71	682	-361
2001-2002	247	269	152	60	209	-51
2002-2003	251	192	160	60	132	-89
2003-2004	254	650	118	66	585	754
2004-2005	253	152	148	101	51	168
2005-2006	251	487	140	134	353	1068
2006-2007	249	1745	138	188	1557	265
2007-2008	250	4707	140	286	4420	1142
1999-2008	2511	9201	1484	1130	8071	3101

Table 4. Comparison of Sharpe Ratio (For Nifty)

Year	Neural Network Model			Buy & Hold Strategy		
	Average Profit per Day	Standard Deviation of Daily Profit	Sharpe Ratio	Average Profit per Day	Standard Deviation of Daily Profit	Sharpe Ratio
1998-1999	0.84	17.51	0.048	-0.35	17.53	-0.020
1999-2000	-1.24	25.93	-0.048	1.86	25.86	0.072
2000-2001	3.85	26.34	0.146	-1.58	26.66	-0.059
2001-2002	1.07	14.62	0.073	0.00	14.66	0.000
2002-2003	0.77	10.25	0.075	-0.62	10.31	-0.060
2003-2004	2.33	22.46	0.104	3.29	22.38	0.147
2004-2005	3.46	26.87	0.129	0.98	27.11	0.036
2005-2006	4.18	26.66	0.157	5.60	26.42	0.212
2006-2007	2.84	60.53	0.047	0.64	60.68	0.011
2007-2008	11.56	101.36	0.114	4.40	102.24	0.043
1999-2008	2.96	42.25	0.070	1.43	42.43	0.034

Table 5. Comparison of Sharpe Ratio (For Junior-Nifty)

Year	Neural Network Model			Buy & Hold Strategy		
	Average Profit per Day	Standard Deviation of Daily Profit	Sharpe Ratio	Average Profit per Day	Standard Deviation of Daily Profit	Sharpe Ratio
1998-1999	1.97	32.37	0.061	2.67	32.42	0.082
1999-2000	9.14	82.69	0.110	5.64	82.93	0.068
2000-2001	9.48	70.59	0.134	-7.85	70.89	-0.111
2001-2002	2.83	21.55	0.131	0.26	21.75	0.012
2002-2003	1.79	17.80	0.100	-1.31	17.89	-0.073
2003-2004	8.47	42.86	0.198	8.68	43.04	0.202
2004-2005	11.33	61.42	0.185	3.43	62.47	0.055
2005-2006	10.88	58.00	0.188	8.77	58.61	0.150
2006-2007	8.29	122.72	0.068	0.15	123.24	0.001
2007-2008	31.68	233.00	0.136	5.57	235.40	0.024
1999-2008	9.59	95.95	0.100	2.62	96.53	0.027

Table 6. Comparison of Sharpe Ratio (For Defty)

Year	Neural Network Model			Buy & Hold Strategy		
	Average Profit per Day	Standard Deviation of Daily Profit	Sharpe Ratio	Average Profit per Day	Standard Deviation of Daily Profit	Sharpe Ratio
1998-1999	1.32	14.78	0.090	-0.56	14.84	-0.038
1999-2000	-0.99	20.75	-0.048	1.36	20.72	0.066
2000-2001	2.72	20.35	0.134	-1.44	20.56	-0.070
2001-2002	0.85	10.74	0.079	-0.21	10.78	-0.019
2002-2003	0.53	7.31	0.072	-0.36	7.37	-0.048
2003-2004	2.30	17.32	0.133	2.97	17.26	0.172
2004-2005	0.20	21.80	0.009	0.66	21.83	0.030
2005-2006	1.41	21.47	0.065	4.25	21.12	0.201
2006-2007	6.25	48.96	0.128	1.07	49.54	0.022
2007-2008	17.68	94.56	0.187	4.57	96.24	0.047
1999-2008	3.21	37.38	0.086	1.23	37.57	0.033

Table 7. Sharpe Ratio and t-statistic of Financial Series

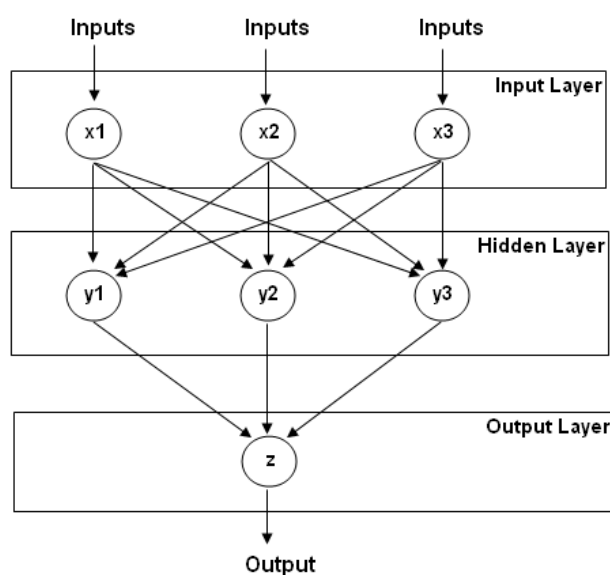| Sl. No.	Financial Series	Average Profit per Day	Standard Deviation of Daily Profit	Sharpe Ratio	t-statistic
1	Nifty	2.96	42.25	0.070	3.51*
2	Junior-Nifty	9.59	95.95	0.100	5.01*
3	Defty	3.21	37.38	0.086	4.30*

* Significant at 1%.

Figure 1. Schematic diagram of an Artificial Neural Network

Applying Fisher Discrimination Approach

to Assessing Customers' Risk in Bank Card Business

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Abstract

The development of bank card business has severely challenged the improvement of risk-controlling technology. While assessing risk is the foundation of risk-controlling in bank card business. Presently, domestic banks have set up their customer data base. By analyzing the status of risk assessing in risk-controlling, this article tries to applying Fisher Discrimination Approach to assessing customers' risk and overcomes the difficulty of determining the influential factors' share in traditional bank assessing approach.

Keywords: Fisher Discrimination Approach, Bank card, Risk assessing

As a high-profit product, bank card has become the very important income resource of service business in foreign banks. In recent years, the income contribution rate of service business in large international banks has reached 30% -70%. Among them, Citibank has reached 70%. Britain's Barclays Bank is about 73%. Till to 2007, Citibank reaches 80%. However, the service business of commercial banks in China accounts for a proportion of average net income only 14%. Just due to the high profitability and strong expansion space, combined with the recent liberal policies on individual consumption credit, China's commercial banks begin to exploit bank card business. However, a variety of reasons cause it's development to be hampered, such as many marketing methods without norms, the lack of a sound domestic personal credit system, as well as the lack of experience and matched risk-control techniques. Chinese commercial banks' bank card business annually suffers from important loss. Analyzing the causes of non-performing assets' forming, this loss has greatly challenged the improvement of bank card business' risk prevention and controlling technology from different perspectives although their risk exposures are very different from each other.

1. The significant of assessing customers' credit risk for controlling bank card business' risk

From the point of view of products features, in addition to the general features of bank products' risk, bank card's risk also has some different characteristics, such as the plastic carrier, the digitized form of transaction, business quickly accepted, unsecured loan, quota credit and so on. Therefore, assessing customers' credit risk will accompany the whole process of using bank card.

Due to economic rapid development, bank card holder's social composition also changes all the time. Changes of income result in changes of paying ability. Someone overdrafts maliciously and crimes by cheating. Many kinds of objective situation and subjective moral factors make card holder reject paying. This has highlighted assessing customers' credit risk and monitoring in a timely manner.

In term of banks' running, as an enterprise, banks take profit maximization as their ultimate goal. According to the positive correlation of risk and revenue income, to deal with bank card's risk should follow the principle of maximizing revenue income with an acceptable level of risk, rather than simply seeking to minimize the loss or zero risk. This requires that banks should find the best balance or combination way among risks, revenue and efficiency, so that they can achieve a balance between bank card's security and convenience which is the very important premise for products' vitality and sustainable development. At the appropriate risk, the capacity and the technology of controlling risks become the key to banks' profitability.

Because of the fierce market competition, the common problem currently faced by card issuers is how to realize the double win between the issuer amount and risk control. Assessing customers' risk is the foundation during the whole process of risk control including risk identification, risk estimation and risk assessment. Only by assessing customers' risk and issuing cards to the applicants, bank card business can begin to run. Accurately assessing customers' risk is an important basis for quota credit. It can play a role of early warning. Based on it, bank can develop appropriate risk

control policies so as to improve its statement and revenue level. As a result, assessing customers' risk plays a very important role throughout controlling bank card business' risk.

2. The introduction and the basic principles of Fisher Discrimination Approach

The traditional approach of assessing customers' risk in Chinese commercial banks is credit score. By comparing the applicant or the borrower's credit history with all borrowers' information in the database, banks check whether the applicant's development trend of statement are the same with those who regularly breach of contract and even bankrupt so as to fall into financial difficult situation. Mainly relying on customers' past credit information which include advantages and disadvantages, this approach gives different index different values and weights them. There are many kinds of calculation methods on credit score. The best-known in the world is FICO credit scoring model which is invented by U.S. engineer Bill Fair and mathematician Earl Isaac in the 1950s. It is still used by three major credit agencies of the United States. But the traditional method has defects on quantifying risk factors which impact bank card and on determining the weight of factors. While FICO credit scoring model is based on that the United States has a sound individual credit system which has not yet owned by China's commercial banks. If it is blind introduced, it can not effectively control bank card risks.

In the 1930s, Fisher presents an approach on linear classification. According to the different types of targets, it adopts appropriate discrimination factors and establishes the relationship formula on factors and targets of discrimination. By selecting the appropriate rules of discrimination and judging a number of factors, it classifies the observed samples. This approach has been widely applied to all fields of medical identification, chemical analysis, rating natural disasters, image recognition, rating credit risk of the stock market listed companies, and so on.

The basic idea of Fisher Discrimination Approach is that: project the points in N-dimensional space to one direction. After transferring data, put the same category points together as far as possible. Meanwhile separate the different points as far as possible. So one can only analyze data in one-dimensional space and classify. This approach does not need the probability distribution of samples. It also does not restrict the independence of variables. However, the probability distribution of samples and the independence of variables are difficult to be achieved during assessing customers' credit risk. Therefore, it is appropriate for this paper.

3. The calculating process of Fisher Discrimination Approach

After selecting one direction, Fisher Discrimination Approach projects the points in N-dimensional space to one-dimensional space. It makes the variance of the same category points as small as possible but the different points' as large as possible. Thus, the values of different samples' risk assessment will have a unified standard.

Assuming that the risk level of all history samples is divided into m, $R^i (i = 1, 2, \cdots, m)$ stands for each level of risk. Symbol "$\succ$" said high or low of different risk levels. For example, "$C^i \succ C^j$" said that the level of i-type risk is higher than that of j-type risk. Higher risk level accompanies lower credit rating. We can get: $C^1 \succ C^2 \succ C^3 \cdots\cdots C^{m-1} \succ C^m$

If the number of samples belonging to $C^i (i = 1, 2, \cdots, m)$ is $n_i (i = 1, 2, \cdots, m)$, each sample is explained by k index which have the same attributes. Thus, one sample which belongs to $C^i (i = 1, 2, \cdots, m)$ reads

$$C_j^i = \begin{bmatrix} C_{1j}^i & C_{2j}^i & \cdots & C_{kj}^i \end{bmatrix}^T (i = 1, 2, \cdots m; j = 1, 2, \cdots n_i)$$

Fisher Discrimination Approach aims at seeking a k-dimensional vector $y = \begin{bmatrix} y_1 & y_2 & \cdots & y_k \end{bmatrix}^T$ which projects every sample to one-dimensional space. Z_j^i is the inner product in one-dimensional space, the formula for that:

$$Z_j^i = y^T C_j^i \ldots\ldots\ldots\ldots (1)$$

Let $\overset{-i}{Z} (i = 1, 2, \cdots, m)$ stand for the projection variance of $C^i (i = 1, 2, \cdots, m)$. Write down:

$$\overset{-i}{Z} = \frac{1}{n} \sum_{j=1}^{n_i} y^T C_j^i = y^T \frac{1}{n} \sum_{j=1}^{n_i} C_j^i$$

Condition 1: if the same category samples' projection variance is as small as possible, that is to meet:

$$\min \sum_{j=1}^{n_i} \left(Z_j^i - \overset{-i}{Z} \right)^2 (i = 1, 2, \cdots, m)$$

Let $\overline{Z}$ be all category samples' projection variance:

$$\bar{Z} = \frac{1}{\sum\limits_{i=1}^{m} n_i} \sum_{i=1}^{m} \sum_{j=1}^{n_i} y^T C_j^i = y^T \frac{1}{\sum\limits_{i=1}^{m} n_i} \sum_{i=1}^{m} \sum_{j=1}^{n_i} C_j^i$$

Condition 2: while (1) should also meet that the variances of different credit category samples are as large as possible, namely:

$$\max \sum_{i=1}^{m} \left(\bar{Z}^i - \bar{Z} \right)^2$$

If formula (1) and the above two conditions are met, one can get the value of y. according to formula (1), a new sample $x = \begin{bmatrix} x_1 & x_2 & \cdots & x_k \end{bmatrix}^T$ multiplies y. get the projection of x in one-dimensional space. Write down: $f(x) = y^T x$. Let $x^* = f(x)$, then classify x according to the distance between x^* and $C^i (i = 1, 2, \cdots, m)$.

If $\left| x^* - \bar{Z}^i \right| = \min \left\{ \left| x^* - \bar{Z}^j \right| \right\} (j = 1, 2, \cdots, m)$, x belongs to C^i.

4. the application of Fisher Discrimination Approach to assessing customers' risk

According that the data of applicants or cardholders are not related to each other and the characteristics of individual data are diverse, banks can set up database of assessing customers' risk from the large data warehouse, which is called the target data. By analyzing the characteristics of applicants or cardholders, form a Boolean multi-dimensional customer data resource. Then deal with extraneous noise of these data. The shifted data are the target data that Fisher Discrimination Approach need.

4.1 ascertaining risk levels

The individual sample's credit risk value is ascertaining figure in history data. But the values in the whole database are continuous from low risk to high risk. The customer group can compose a continuous credit value chain. Such as:
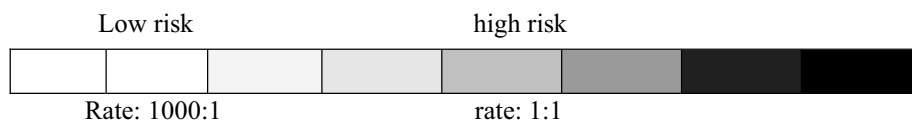
According to customers' history notes, credit habit, development trend of statement, the law of breach of contract and financial difficult situation due to bankrupting, ascertain the amount and the critical value of different risks. Namely make sure of the value of m and $C^i (i = 1, 2, \cdots, m)$ in Fisher Discrimination Approach.

4.2 shifting data and indexes

Not all indexes gotten from customers' initial data can be used in measuring risk level. First of all, analyze the correlativity of the data in statistics method so as to dislodge strong correlative data. Meanwhile, deal with extraneous noise of these data to improve the weight of the single index. After shifting data and indexes, get the target data and indexes. They still cannot be used and need shifting. For example, one cannot directly use personal month income, personal disposable income, month expenses, and so on. But should shift them into more integrated index to measure customers' payment ability, such as by R= (m+p+b+s)/I. Among them, R is the rate of debt and income; m is mortgage payment; p is installment payment; b is credit card payment; s is credit circulation payment of retailing; I is monthly income.

By shifting them, get the prepared data and indexes. Namely, ascertain $C_j^i = \begin{bmatrix} C_{1j}^i & C_{2j}^i & \cdots & C_{kj}^i \end{bmatrix}^T (i = 1, 2, \cdots m; j = 1, 2, \cdots n_i)$. The projection variance in the Discrimination formula can be calculated.

All the above are gotten from history data. According to them, one can make out y in the Discrimination formula.

4.3 testing samples

For any sample $x = \begin{bmatrix} x_1 & x_2 & \cdots & x_k \end{bmatrix}^T$, one can get its $Z_j^i = y^T x$ which meets the two conditions and formula (1). After projecting the sample from N-dimensional space to one-dimensional space, scompare it with $\left| x^* - \bar{Z}^i \right| = \min \left\{ \left| x^* - \bar{Z}^j \right| \right\} (j = 1, 2, \cdots, m)$.

According to $C^i (i = 1, 2, \cdots, m)$, ascertain x's risk level.

4.4 verifying Fisher Discrimination Approach

The validity of the formula coefficient y achieved from the above process need verifying. However, due to Chinese

commercial banks' exploiting their credit card business only from 2003, together with the incomplete social credit system, the existing database is not large enough to verify the formula by a part of data which are put away. Based on the actual situation in Chinese Commercial Banks, the current database applies to cross-validation approach to verify the validity of the formula coefficient. Banks can put away a part of historical data as verification samples and ensure that they are random. Calculate the validity of the formula coefficient y in the other part of data. After many occasions' repeating this process, achieve a comprehensive amendment. Take it as the final value.

After achieving the result, banks should continue monitoring its validity even if it is effective enough at the beginning. Change the detection method, if necessary. Therefore, a successful model calls for dynamically developing.

With the development of policy and market, the value of indexes and the weight of impact factors applied to assessing customers' credit risk are changing all the time. Banks should often verify the formula and timely update the value of y so as to complete the index system and maintain discrimination effective.

5. The advantages of applying Fisher Discrimination Approach to assessing customers' credit risk

This method combines Fisher Discrimination Approach to assessing customers' credit risk. Based on customers' credit record, relying on a computer powerful computing capability, it provides an objective technology for bank card business to control its risks. And it overcomes the difficulties of traditional credit scoring methods and FICO credit scoring model. It has the following relative advantages:

5.1 The loose conditions of Fisher Discrimination Approach

Whether Logistic regression method, the neural network, classification tree method, or any other linear classification method, scoring models based on them strictly regulate the samples' state and attribute. While Fisher Discrimination Approach requires less conditions. This approach does not need the probability distribution of samples. It also does not restrict the independence of variables. However, the probability distribution of samples and the independence of variables are difficult to be achieved during assessing customers' credit risk.

5.2 The objective and comprehensive index

This credit risk assessing model is based on the principle of large numbers and statistics technology. The indexes in the model are digital, which do not need artificial quantization process. So it avoids the disadvantages of traditional scoring models and reveals the universal law of bank card customers' credit risks. However, the indexes in traditional models are achieved from artificial quantization process.

While preparing for the model, quantities of influential deriving variables are assessed, compared with each other and selected in statistics technology. So the final equation is usually verified by the multi-dimension representative information. It can comprehensively assess customers' credit risk.

5.3 The accurate conclusion and the unified classification standards

No matter how many times repeat the assessment process, only f use this approach, any businessman can draw the same conclusion at any time, in any branch. So the classification standards are unified. Multiplying the coefficient matrix achieved during the first process by the test samples, get the result of scoring. In addition, the model dynamically develops. Banks often verify the formula and timely update the value of y so as to maintain discrimination effective. So it can accurately ascertain customers' credit risk level.

5.4 the high efficiency

This credit risk assessment model can be put into computers. So long as putting into the relevance information, the computer implements automatically and make out the results just within several seconds. So it applies to assessing customers' comprehensive information, especially when customers' data are complicated. However, if only artificially assessing millions of applications' statement and credit risk, the labor costs a lot and accepting speed is too low. Therefore, it has high efficiency.

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Financial Liberalization and Stock Markets Integration

for Asean-5 Countries

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Abstract

This paper examines the relationship of financial liberalization and stock markets integration among ASEAN-5 (Note 1) stock markets: Indonesia, Malaysia, the Philippines, Singapore and Thailand. Three sample periods are covered based on the progress of financial liberalization. By using Johansen and Juselius multivariate cointegration procedures, Granger-causality tests and variances decomposition analysis, the results indicate no long-run relationship during Singapore stock market liberalization in the first period. However, long-run relationship established between ASEAN-5 stock markets in the second period when Thailand, Malaysia and Indonesia have liberalized their stock markets and the third period following the Philippines liberalization. The long run integration relationships and the short-run causality relationships among ASEAN-5 markets have both increased after the financial liberalization. Thailand, Malaysia, Indonesia and the Philippines markets have received increased influences from other stock markets in the progress of financial liberalization whereas Singapore remains unaffected by the others. Stock markets that liberalize earlier will have greater influence on other stock markets.

Keywords: Financial liberalization, Stock markets integration, ASEAN-5 stock markets, Portfolio diversification

1. Introduction

The study of market integration holds important implications for the theory of financial economics in the degree to which markets are integrated determines the benefits from diversification of investment portfolios. Recent years have seen considerable attention devoted to the analysis of linkages among stock markets in different countries. After the stock market crash in October 1987, there was a considerable interest in investigations of the linkages between stock markets. A decade later, the financial crisis of 1997 in Asian markets has renewed this interest. This issue is an important concern for investors because greater integration among stock markets implies that reducing the opportunities for international diversification. Interest in this topic has also been enhanced by the liberalization of financial markets, progressive relaxation of controls on international capital movements and the increasing importance of cross-border equity flows. (Note 1)

Equity market liberalization could have a favorable impact on the country economy in many aspects. Several empirical studies have shown that liberalization has had a positive effect on developing economies via the decreased cost of equity, increased returns, increased private physical investment and the growth of economics. (Note 2) Stock market liberalization, if effective, will lead to important changes in both the financial and real sectors as the countries stock

markets become integrated into world stock markets. The existence and absence of integration and interdependencies involves several important issues, including the benefits to portfolio diversification and development of the policy frameworks. Traditionally investors have considered only developed markets in their international diversification strategy. These markets have been in operation for a long time and most international performance benchmarks included only developed markets. However, investor interest in emerging markets appears to have increased significantly over the last few years. As noted by Kawakatsu and Morey (1999), the result of the financial liberalization had been quite dramatic as in 1985, the flow of foreign portfolio investment into emerging markets was only US$138 million. However, by 1993, the Dow had increased to a remarkable US$45 billion. The study of Shawky *et al.* (1997) also mentioned that the net foreign capital flow to emerging equity markets in 1993 was around $37 billion. The foreign inflow of capital also helped spark a boom in emerging markets stock prices, as studied by Henry (2000a), the real dollar price of all emerging market equity increased by more than 300% from December 1984 to December 1994.

The ASEAN countries that from the most to the least developed, have been working diligently to enhance the efficiency, strength and depth of their financial systems. One of those significant developments occurred in these ASEAN economies is the implementations of deregulation and liberalization of financial market in the region. Development of the financial sector has been a salient policy goal for most ASEAN member since the mid-1980s. In the latter half of 1980s and early years of 1990s, most of the governments of ASEAN have gradually liberalized their stock markets. (Note 3) Stock market liberalization is a decision by a country's government to allow foreigners to purchase shares in that country's stock market. It gives foreign investors the opportunity to invest in domestic equity securities and domestic investors the right to transact in foreign equity securities.

The five ASEAN stock markets namely Indonesia, Malaysia, the Philippines, Singapore and Thailand are the countries originally included in the Association of South East Asian Nations (ASEAN) when the Bangkok Declaration was signed on 8 August 1967. These ASEAN countries have been trying to diversify their heavy reliance on the banking sector in favor of other financial intermediation vehicles including stock and fixed-income markets. Importantly, it limits the way in which a financial system can price risk efficiently. Hence, while one would always expect the banking sector to assume a key financial intermediary role in the ASEAN countries, and fostering its health should be a perpetual priority, the development of alternative markets could be extremely important for the long-run growth and development of the financial sector, as well as the entire economy. Therefore, greater emphasis by ASEAN on the development of stock and bond markets is not only appropriate but also essential.

The spectacle of price collapses around the world during the October 1987 stock market crash provided an early warning to the country about the risk elements embedded in those integrated financial markets. In the 1997, East Asian financial and currency crisis further demonstrated how powerless a group of integrated economies could become in the midst of financial market meltdowns and the degree of market integration among some of these countries had become sufficiently high to facilitate the worst contagion of financial crisis. Rather than looking through a global perspective, this study will just focus on the five major ASEAN stock markets.

There also exists little empirical evidence concerning the factor that causes short and long-term market linkages among ASEAN countries. This is an important omission since notions of stock markets integration have obvious implications for comovements between stock markets. Many international studies concerned with market linkages are relatively commonplace. Example the studies of Masih and Masih (1997a,b, 1999, 2001a,b, 2002), Bekaert, Harvey and Lumsdaine (2001), Leong and Felmingham (2001), Phylaktis and Ravazzolo (2002, 2005), Drew and Chong (2002) and Bekaert, Harvey and Ng (2003) are subject to increasing attention, but few studies have adopted an exclusively ASEAN perspective. No study to date has examined stock market linkages across the broad spectrum of ASEAN-5 member stock markets that take into account of the factor of financial liberalization. An investigation of the factors that influence the dynamic linkages and relationship among the stock markets are needed to provide a better grasp of the functioning of the stock markets to the investor and policy makers. This paper attempts to examine the factor of financial liberalization that becomes one of the factors causing the stock markets integration.

For most emerging markets, liberalization is an essential policy tool that attracts much needed foreign capital for investment purposes. Financial literature has presented a strong emphasis on the integration on stock markets with the interest increased considerably following the abolition of foreign exchange controls, the introduction of innovative financial products, such as Country Funds and American Depository Receipts, which have created more opportunities for global international investments. Thus, this implies that financial liberalization has contributed to the stock markets integration. However, studies from Phylaktis and Ravazzolo (2005) examined the effect of stock market liberalization on financial linkages among seven Asian capital markets (Japan, Hong Kong, South Korea, Malaysia, Singapore, Taiwan and Thailand) and the U.S. over two sub-periods: the 1980-1989 pre-liberalization period and the 1990- 1998 post-liberalization period. The results show that all the stock markets are not linked together for both the 80s and the 90s periods and that the U.S plays a small role while Japan's role is more significant. Similar results were found for the open markets of Hong Kong and Malaysia for the 80s. This evidence suggests that the relaxation of foreign exchange

restrictions is not sufficient to attract international investors' attention and strengthen international market interrelations. Related findings from Bekaert and Harvey (2000), they point out liberalization may not be enough to induce foreign investors to actually invest in the country.

This study aims to investigate whether the process of financial liberalization has contributed to the stock market integration in the context of ASEAN-5: Indonesia, Malaysia, the Philippines, Singapore and Thailand, whereby these countries have a different economic and financial structure and political background. If these ASEAN-5 stock markets are independent then investors can diversify their portfolio in these different stock markets. On the other hand, the authorities in the region need not worry about any contagious effects if one market experiences any turmoil. As highlighted by Shawky *et al.* (1997) portfolio diversification is always a reasonable method of reducing the risk of an investment portfolio without negatively affecting its return expectations.

2. Data and Methodology

2.1 Data

This paper examines the relationship between emerging stock markets in five ASEAN countries, namely Indonesia (Jakarta S.E. Composite), Malaysia (Kuala Lumpur Composite), the Philippines (S.E. Composite), Singapore (Straits Times Index) and Thailand (Bangkok S.E.T.). The daily closing values, denominated in home-country currencies and the data set is obtained from Kuala Lumpur Stock Exchange (KLSE). All the series are transformed into natural logarithm form. The full sample period covering the period of 2/01/1986 to 30/06/1997 is further divided into three sub-periods. First sub-period covers from 2/01/1986 to 31/08/1987. In this period only Singapore has liberalized it stock market and there is a need to investigate whether Singapore was the earliest country that liberalized it stock market and can it lead to the ASEAN-5 stock market being cointegrated. The second sub-period starts from 1/09/1987 to 30/06/1991, this period include three countries, which is Thailand, Malaysia and Indonesia that have liberalized their stock markets. It needs to investigate whether more countries liberalizing their stock markets can leads to the ASEAN-5 stock markets being more cointegrated. The last sub-period covers from 1/07/1991 to 30/06/1997, when the Philippines liberalized it stock market in ASEAN-5. In this period, all ASEAN-5 stock markets are liberalized and employed the data before the 1997 Asian crisis to avoid the critical period. It's more important within the scope of this paper to investigate the stock market reactions on whether financial liberalization can contribute to the stock market being more integrated compared with the first and second periods.

2.2 Methodology

This study has employed the unit root test to determine whether data series are stationary. The Johansen and Juselius (1990) multivariate cointegration technique that uses maximum likelihood procedures is employed to determine the number of cointegration vectors among a vector of time series. Cointegration test is test to determine whether a linear combination of the variables under consideration is stationary and optimal lag has to be selected by using Akaida Information Criterion (AIC). Given that the variables are integrated to the order one, a causal long-term relationship might be present among these non-stationary variables. In order to examine the short-run relationships, Granger (1969) causality tests are specified. Essentially tests of the prediction ability of time series models, an index causes another index in the Granger sense if past values of the first index explain the second, but past values of the second index do not explain the first. Finally an unrestricted vector autoregressive (VAR) variance decomposition test will be conducted. The objective is to analyze the degree to which a change in one country's stock price exerts an influence on a change in other countries' stock price series. The variance decomposition test will show the proportion of the movements in the stock index that is due to its own shocks versus those originating from other markets.

3. Empirical Results

Augmented Dicker Fuller (ADF) tests of the null hypothesis of nonstationarity are performed on each of the ASEAN-5 stock prices indices in level and first-differenced forms for the three sub-periods. Analysis of the levels series indicates non-stationarity for all markets at 0.01 levels. However, all of the ADF test statistics are significant at the 0.01 levels in first differenced form, indicating stationarity and showed that the indices with differences sub sample periods are integrated at the same order of one or I (1).

Johansen and Juselius' procedure (1990) multiple cointegration vectors are used to examine whether the ASEAN-5 stock price indices are cointegrated and also to obtain the cointegration rank. The tests provide different finding on the cointegrating relationships over each sub-periods. The trace test statistics indicated that the order of cointegration is 1 during first and second periods whereas the order of integration of two happens in the last period. In terms of linkages of long-run nature, the results suggest that the stock market indices are bonded together by long-run relationships in the second and third period but not in the first period. Therefore, financial liberalization contributed to the stock markets integration is significant established.

The Granger causality test result depicted in Figure 3.1. In the first period, the causal relationships are running from Thailand to Indonesia market, Singapore to Malaysia and Thailand to the Philippines. Thailand seems as a leader

whereby it affected two countries, Indonesia and Philippines. No feedback is found among ASEAN-5 and they're just a few causality relationships only. The result offer some evidence that the earliest country liberalized their stock markets countries (Singapore) and the country that start to liberalizing their stock market (Thailand) tend to lead the market that haven't liberalized their stock market yet. During the second period, Singapore is found causal the Malaysia and Thailand markets and affected by Malaysia and the Philippines. There is two-way causal relationship found in Singapore and Malaysia markets. On the other hand, the Philippines are leading the Singapore and Malaysia markets. (Note 4) Thailand does not causal any other countries and it effected by Singapore only. Surprisingly, other markets do not affect the Indonesia and the Philippines market in this period. Indonesia does not being led by other countries in the second period. The disappearance of its causal links with other markets could be it is the last country that liberalized it stock market in the second period. In the third period witnesses some changes to the causality relationship. The causation from Philippines to Singapore and Malaysia not longer exist. The Philippines does not affected any others market, however it affected by Singapore market. In this period, Indonesia market is affects by the Malaysia market and Thailand market. There are two-way causal relationships between Indonesia and Thailand markets. Malaysia market and the Philippines market are found causal by Singapore market only. However, Singapore is not causal by other markets and it became a leader to Malaysia, Thailand and Philippines markets.

For both three periods of the financial liberalization progress, it can be observed that the linkages have increased after all ASEAN-5 countries liberalized their stock markets. It is also found that the earliest country that liberalized their stock markets (Singapore) has an increased affected on those stock markets that were not liberalized yet (i.e. Malaysia, Thailand, the Philippines). This implies an increase in integration among ASEAN-5 stocks markets after the financial liberalization on stock markets. Thus, provide a significance of this paper is whereby the integration of the ASEAN-5 will limit the benefits of portfolio diversification by investors in this region. (See Figure 1)

Insert Figure 1 Here

Variance Decomposition Analysis

The variance decomposition for 5, 10, 15, 20, 25 and 30 days forecasts error variances of the ASEAN-5 member stock markets for the three sub-periods are reported in Table 3.1. The entries in the table are the percentages of return forecast error variance of a market that can be explained by random innovations of its own market as well as those of the other markets.

For Singapore market, the average 94.406% is explained by its own forecast error variances, whereas average 0.080% variance is explained by Thailand market, 0.052% (Malaysia), 0.091% (Indonesia) and 5.370% (Philippines) in the first period. The average variance explained by other countries falls from 5.594% to 4.182%, mainly due to the decreased influence in the Philippines market. The Singapore market in the third period, averaging of 99.530% is explained by its own forecast error variances. In the context of Thailand market, Singapore explained an average 10.118% of the variance to Thailand market in the first period and increased to average 42.703% the second period. Singapore is the most influence in the Thailand market and this consistent with the causation relationship. However, the total external influences from Singapore decreased to 17.337% in the third period. Malaysia, Indonesia and the Philippines face the decreased influences on the Thailand market. Malaysia market explains only average 40.185% of its own forecast error variances, whereas an average 55.595% of variance is explained by the Singapore market in the first period. In the second period, Singapore explains a major portion of its variance with average of 74.866% to Malaysia market. However, the external influences from Singapore grew weakly in the third period, but still explained a highly forecast of error variance about 47.214% to Malaysia market. For Indonesia market, Thailand explained an average of 4.888% of the variance in Indonesia market in the first period. In the second period, the external influence decreased to 1.061% thus this is similar with the causality result which Indonesia does not have any linkages with the other four markets. The average of 98.939% was explained by it own forecast error variances. However, in the third period, the average 21.945% out of 27.399% of its forecast variances are explained by the Singapore market mainly due to the Singapore effect having grown stronger from average 0.462% to 21.945%. In the Philippines market, Thailand market explains a major portion of its variance to the Philippines market, which is 8.250% in the first period. In the second period, the total influence to the Philippines market increased from 13.318% to 16.731% mainly due to increased influences by Singapore market. Surprisingly, the external influences have increased from 16.731% to 25.014% after the financial liberalization, mainly due to the influence of Singapore.

The results show that the variation in Singapore is greatly explanative by itself for the three periods while Thailand, Malaysia, Indonesia and the Philippines were explained by the other stock markets. Thailand, Malaysia and the Philippines received increased influences from external factors and Singapore, Indonesia are received decrease influence in the second period. For the third period, the evidence of increasing influence from external factors is from the stock market of Indonesia and the Philippines. On the other hand, Singapore and Thailand and Malaysia faced a decrease after all ASEAN-5 stock market had liberalized. But, it still shows that the Malaysia market is still highly explained by the Singapore market with the average of 47.214%. Generally, Singapore market showed a continue

decrease the external factors that explained it market after the liberalization. Meanwhile, only the Philippines stock market is showing a continued increase the external factor, followed by the progress of financial liberalization in the three periods. Malaysia market is the most 'endogenous' market, which highly explained by Singapore market for the three periods. All the results give evidence that the integration of ASEAN-5 stock markets grow stronger after the financial liberalization in stock markets. It is found that those countries that liberalized their stock market later (Indonesia and the Philippines) are greatly receiving increasing influences from those earlier liberalized markets (Singapore and Thailand and Malaysia.). (See Table 1)

Insert Table 1 Here

4. Conclusion

The findings show that after all the ASEAN-5 financial liberalization, Singapore is not causal by other markets and it became a leader that mainly affected to Malaysia, Thailand and Philippines markets. The variation in Singapore has greatly explanative by itself for the three periods while Thailand, Malaysia, Indonesia and the Philippines was explained by other stock markets. These results are supported by Roca *et al.* (1998) that Singapore market is the dominant in influencing the other four stock markets.

It is interesting to note that Thailand, Malaysia and the Philippines receive increased influences from external factors. The major external factors come from the stock markets of Indonesia and the Philippines. Malaysia market is the most 'endogenous' market, which highly explained by Singapore market for the three periods. More interestingly, those countries that liberalized their stock market later (Indonesia and the Philippines) are greatly receiving increasing influences from those earlier liberalized markets (Singapore and Thailand and Malaysia). The results are in line with the study by Yang and Siregar (2001), suggest clearly that the financial liberalizations have enhanced interaction and integration between the stock markets in the Asia-Pacific region.

In summary, ASEAN-5 stock markets become more integrated after the financial liberalization in the long run perspective. The ASEAN-5 stock markets share a common trend that implies the markets move together and driven by common shocks, which have a permanent effect, providing limited long-term gains to international diversification. From the view of investor, market integration will reduce the scope for diversification possibilities. The benefits of any diversification are limited within the region. Therefore, investors with long run horizons may not benefit from an investment made across the countries in this ASEAN region.

Further research is suggested to take others factor into consideration such as the ASEAN economic cooperation and the advanced of Information technology to compare the main influences that bring to the linkages of ASEAN stock markets. The financial liberalization leads to the increasing in ASEAN-5 stock market integration raises the fundamental questions: Does the financial liberalization bring the advantages to the ASEAN-5 stock markets? This is important for the investor to well allocate their investment in to a good portfolio diversification. This paper shows the evidence of financial liberalization will cause the stock market becomes more integrated in the long run. Thus, this will limit the participation of the foreign investors whereby they will looking ASEAN-5 countries in a group that the stock markets are not be the choice for the portfolio diversification. Therefore, the future research is warranted to shed more light on whether the ASEAN-5 market stock prices have become more efficient after the financial liberalization.

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Notes

Note 1. See Bekaert and Harvey (2000), Henry (2000a,b) Bekaert, Harvey and Lumsdaine (2002), Bekaert, Harvey and Lundblad (2001, 2002, 2004), Chari and Henry (2001), Kamisky and Schmukler (2002), Neaime (2002), Das and Mohapatra (2003).

Note 2. See Bekaert and Harvey (2000), Bekaert, Harvey and Lumsdaine (2002), Bekaert, Harvey and Lundblad (2001, 2002, 2004), Henry (2000a,b), Kim and Singal (2000).

Note 3. See example from Bekaert & Harvey (2000) for more details on financial liberalization progress.

Note 4. The Singapore markets lead by the Philippines may be due the high investment by Singapore in the Philippines.

Table 1. Variance Decomposition Analysis Results

Table 1 a. SINGAPORE

Percentage of k days ahead forecast error variance of Singapore stock indices accounted by the innovation of Thailand, Malaysia, Indonesia and the Philippines.

First period: 1986.01-1987.08

k	SINGAPORE	THAILAND	MALAYSIA	INDONESIA	PHILIPPINES
1	100.000	0.000	0.000	0.000	0.000
5	98.703	0.005	0.062	0.054	1.178
10	96.792	0.012	0.048	0.087	3.060
15	94.627	0.031	0.034	0.109	5.198
20	92.388	0.075	0.038	0.124	7.375
25	90.201	0.155	0.066	0.132	9.446
30	88.132	0.280	0.118	0.134	11.336
Average	*94.406*	*0.080*	*0.052*	*0.091*	*5.370*

Second period: 1987.09-1991.06

k	SINGAPORE	THAILAND	MALAYSIA	INDONESIA	PHILIPPINES
1	100.000	0.000	0.000	0.000	0.000
5	97.366	0.087	0.444	0.022	2.081
10	95.257	0.161	0.241	0.210	4.132
15	94.683	0.333	0.167	0.494	4.324
20	94.555	0.527	0.136	0.675	4.107
25	94.492	0.770	0.127	0.839	3.772
30	94.376	1.055	0.130	0.993	3.446
Average	*95.818*	*0.419*	*0.178*	*0.462*	*3.123*

Third period: 1991.07-1997.06

k	SINGAPORE	THAILAND	MALAYSIA	INDONESIA	PHILIPPINES
1	100.000	0.000	0.000	0.000	0.000
5	99.557	0.043	0.024	0.373	0.003
10	99.469	0.030	0.017	0.481	0.003
15	99.439	0.025	0.015	0.518	0.003
20	99.424	0.023	0.014	0.536	0.003
25	99.415	0.022	0.013	0.548	0.002
30	99.408	0.021	0.013	0.556	0.002
Average	*99.530*	*0.023*	*0.014*	*0.430*	*0.002*

Table 1 b. THAILAND
Percentage of k days ahead forecast error variance of Thailand stock indices accounted by the innovation of Singapore, Malaysia, Indonesia and the Philippines.

First period: 1986.01-1987.08

k	SINGAPORE	THAILAND	MALAYSIA	INDONESIA	PHILIPPINES
1	0.255	99.745	0.000	0.000	0.000
5	1.520	97.455	0.007	0.958	0.061
10	4.658	93.964	0.004	1.336	0.038
15	8.878	89.466	0.006	1.617	0.034
20	13.648	84.413	0.011	1.869	0.060
25	18.555	79.189	0.013	2.101	0.141
30	23.311	74.063	0.013	2.311	0.301
Average	*10.118*	*88.328*	*0.008*	*1.456*	*0.091*

Second period: 1987.09-1991.06

k	SINGAPORE	THAILAND	MALAYSIA	INDONESIA	PHILIPPINES
1	18.408	81.592	0.000	0.000	0.000
5	37.507	61.702	0.012	0.577	0.201
10	46.241	50.932	0.629	0.729	1.469
15	48.332	48.003	0.891	0.491	2.284
20	49.201	46.859	0.958	0.386	2.596
25	49.555	46.372	1.001	0.327	2.745
30	49.676	46.198	1.026	0.287	2.813
Average	*42.703*	*54.523*	*0.645*	*0.400*	*1.730*

Third period: 1991.07-1997.06

k	SINGAPORE	THAILAND	MALAYSIA	INDONESIA	PHILIPPINES
1	9.756	90.244	0.000	0.000	0.000
5	17.494	82.099	0.181	0.042	0.184
10	18.630	80.865	0.175	0.025	0.304
15	18.873	80.573	0.159	0.024	0.371
20	18.910	80.496	0.142	0.029	0.423
25	18.877	80.493	0.128	0.035	0.467
30	18.818	80.519	0.116	0.042	0.506
Average	*17.337*	*82.184*	*0.129*	*0.028*	*0.322*

Table 1 c. MALAYSIA

Percentage of k days ahead forecast error variance of Malaysia stock indices accounted by the innovation of Singapore, Thailand, Indonesia and the Philippines.

First period: 1986.01-1987.08

k	SINGAPORE	THAILAND	MALAYSIA	INDONESIA	PHILIPPINES
1	33.485	0.582	65.932	0.000	0.000
5	51.095	0.122	48.321	0.353	0.109
10	56.369	0.097	42.016	0.949	0.569
15	59.458	0.094	37.500	1.679	1.270
20	61.590	0.082	33.720	2.487	2.121
25	63.080	0.071	30.489	3.317	3.043
30	64.087	0.081	27.729	4.128	3.975
Average	*55.595*	*0.161*	*40.815*	*1.845*	*1.584*

Second period: 1987.09-1991.06

k	SINGAPORE	THAILAND	MALAYSIA	INDONESIA	PHILIPPINES
1	66.987	0.437	32.576	0.000	0.000
5	72.819	0.259	25.415	0.023	1.484
10	77.798	0.441	18.569	0.048	3.144
15	77.962	0.760	17.730	0.151	3.397
20	77.313	1.065	18.218	0.216	3.188
25	76.247	1.413	19.193	0.275	2.872
30	74.936	1.792	20.372	0.329	2.571
Average	*74.866*	*0.881*	*21.725*	*0.149*	*2.379*

Third period: 1991.07-1997.06

k	SINGAPORE	THAILAND	MALAYSIA	INDONESIA	PHILIPPINES
1	38.927	1.654	59.419	0.000	0.000
5	46.723	2.059	51.116	0.055	0.047
10	48.450	2.259	49.055	0.034	0.202
15	48.973	2.464	48.050	0.069	0.443
20	49.155	2.661	47.276	0.164	0.745
25	49.173	2.847	46.591	0.303	1.086
30	49.099	3.021	45.956	0.474	1.450
Average	*47.214*	*2.423*	*49.638*	*0.157*	*0.567*

Table 1 d. INDONESIA

Percentage of k days ahead forecast error variance of Indonesia stock indices accounted by the innovation of Singapore, Thailand, Malaysia and the Philippines.

First period: 1986.01-1987.08

k	SINGAPORE	THAILAND	MALAYSIA	INDONESIA	PHILIPPINES
1	0.138	0.061	0.015	99.785	0.000
5	0.575	1.845	0.016	96.727	0.836
10	0.551	3.292	0.117	94.736	1.305
15	0.502	4.818	0.300	92.667	1.713
20	0.475	6.425	0.513	90.491	2.096
25	0.477	8.067	0.722	88.285	2.448
30	0.512	9.706	0.913	86.112	2.758
Average	*0.462*	*4.888*	*0.371*	*92.686*	*1.594*

Second period: 1987.09-1991.06

k	SINGAPORE	THAILAND	MALAYSIA	INDONESIA	PHILIPPINES
1	0.016	0.109	0.047	99.829	0.000
5	0.329	0.315	0.055	99.249	0.052
10	0.520	0.374	0.118	98.944	0.044
15	0.666	0.335	0.130	98.803	0.066
20	0.772	0.318	0.137	98.692	0.081
25	0.878	0.302	0.140	98.582	0.099
30	0.978	0.288	0.140	98.475	0.118
Average	*0.594*	*0.292*	*0.110*	*98.939*	*0.066*

Third period: 1991.07-1997.06

k	SINGAPORE	THAILAND	MALAYSIA	INDONESIA	PHILIPPINES
1	7.616	0.390	0.923	91.072	0.000
5	18.073	1.372	2.940	77.464	0.151
10	22.037	1.337	3.748	72.754	0.124
15	24.224	1.283	4.483	69.928	0.082
20	25.897	1.229	5.177	67.616	0.081
25	27.288	1.179	5.828	65.591	0.113
30	28.482	1.134	6.433	63.781	0.171
Average	*21.945*	*1.132*	*4.219*	*72.601*	*0.103*

Table 1 e. THE PHILIPPINES

Percentage of k days ahead forecast error variance of the Philippines stock indices accounted by the innovation of Singapore, Thailand, Malaysia and Indonesia.
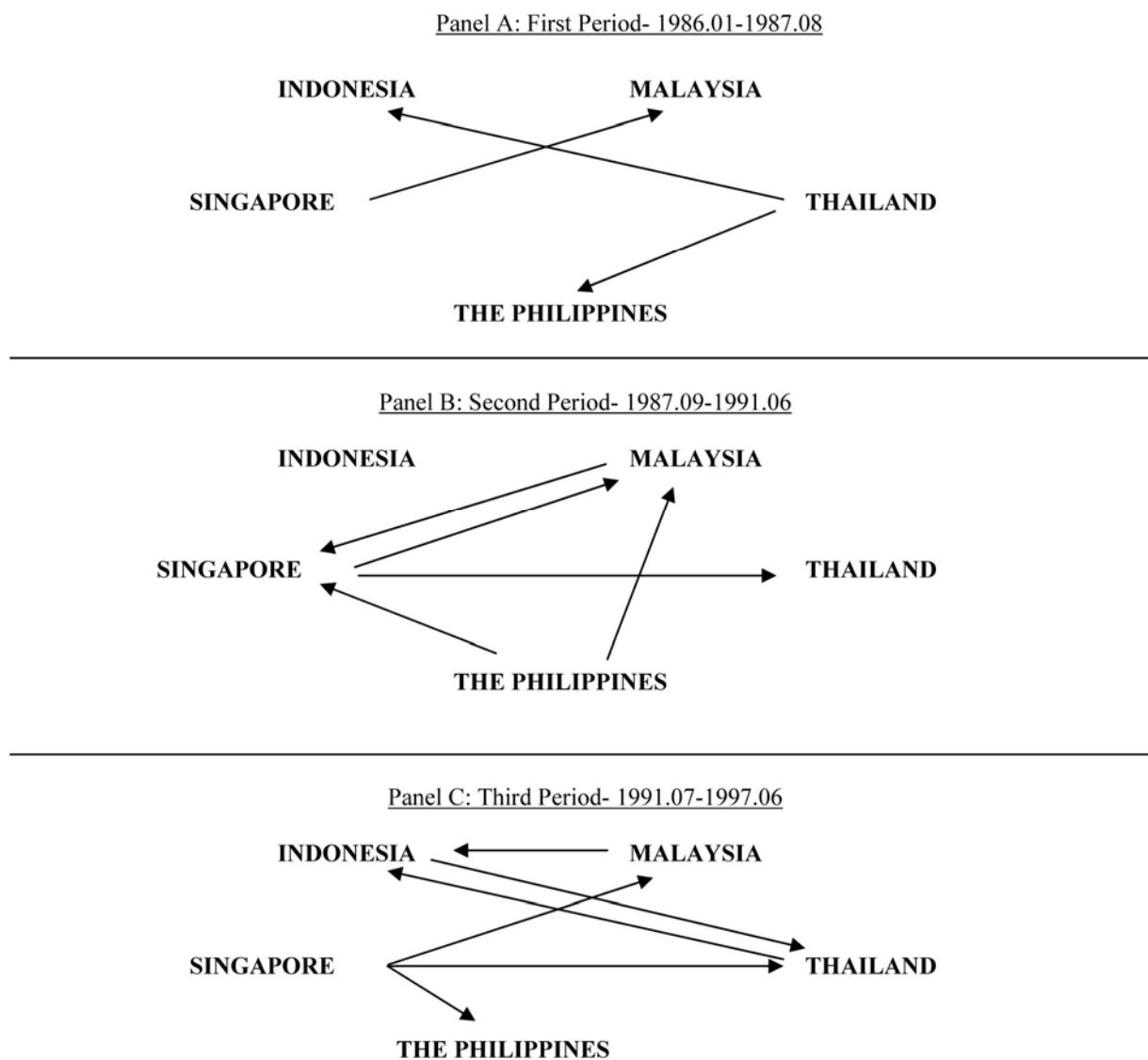
First period: 1986.01-1987.08

k	SINGAPORE	THAILAND	MALAYSIA	INDONESIA	PHILIPPINES
1	0.078	0.581	0.062	0.022	99.258
5	0.729	3.697	0.117	0.006	95.451
10	2.002	6.243	0.094	0.004	91.657
15	3.824	8.676	0.209	0.003	87.287
20	6.121	10.953	0.395	0.004	82.526
25	8.771	12.962	0.594	0.008	77.665
30	11.646	14.639	0.772	0.013	72.931
Average	*4.739*	*8.250*	*0.320*	*0.009*	*86.682*

Second period: 1987.09-1991.06

k	SINGAPORE	THAILAND	MALAYSIA	INDONESIA	PHILIPPINES
1	7.552	0.502	0.049	0.069	91.827
5	12.274	0.482	0.418	0.443	86.383
10	16.705	0.458	0.286	0.402	82.148
15	18.160	0.633	0.210	0.592	80.405
20	18.185	0.745	0.176	0.707	80.186
25	17.592	0.843	0.161	0.781	80.624
30	16.779	0.930	0.154	0.831	81.307
Average	*15.321*	*0.656*	*0.208*	*0.546*	*83.269*

Third period: 1991.07-1997.06

k	SINGAPORE	THAILAND	MALAYSIA	INDONESIA	PHILIPPINES
1	4.780	0.939	0.315	1.360	92.605
5	13.410	2.120	1.620	1.747	81.104
10	17.124	2.224	2.700	1.310	76.643
15	19.860	2.178	3.816	0.944	73.202
20	22.209	2.101	4.950	0.713	70.027
25	24.275	2.017	6.065	0.595	67.049
30	26.100	1.933	7.133	0.562	64.271
Average	*18.251*	*1.930*	*3.800*	*1.033*	*74.986*

Panel A: First Period- 1986.01-1987.08

Panel B: Second Period- 1987.09-1991.06

Panel C: Third Period- 1991.07-1997.06

Denote: "——▶ ": Indicates the 'causal' relationships exist. (Significant at 5% level).

X ——▶ Y indicates that changes in X contain leading information for changes in Y.

(i.e. changes in X granger cause changes in Y or changes in Y lags changes in X).

X ◀—— Y implies the reverse.

Figure 1. The summary results of Granger causality tests

Customer Relationship Management and Privacy

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Abstract

This report introduces concepts of CRM and privacy. Now companies have realized importance of customers to business development. They begin to use CRM to aid themselves and provide best services for customers.

The fundamental action within CRM is to gather customer data that causes the privacy issues and, thereby to some extents, limit the data collection. As a result it has negative effects on quality of customer services and also reduce company profits.

In order to better the situation, this report also illustrates what should be done to leverage between data collection from customers and privacy concerns.

Keywords: CRM, Privacy, Loyalty

1. Introduction

In the modern business world, for increasing competition, companies collect and analyze customer information with the help of effective CRM. In this way, companies can get comprehensive view about customers and provide suitable services for them.

However, when information is gathered, problem of privacy appears.

This report will describe relative theories and current situation in CRM and privacy issues. Meanwhile, some proposed solutions for privacy concerns also could be discussed.

2. Description of CRM

2.1 Motivation of CRM

In the changing business world, the competition becomes fiercer. Customers have more choices for their purchasing and won't be loyal to one brand product. As WhitePaper (2000) described customers like giving business to companies that best meet their requirements.

In order to maintain customer loyalty and obtain profits, companies should make a shift from previous product-driven business strategies to customer-driven business strategies (WhitePaper, 2000). So companies should pay attention to how to measure profitable customers and how to create value for those customers.

In the shifting, customer relationship becomes important obviously. Companies have recognized that keeping a good customer-company relationship is a vital factor for success. Consequently, they need effective methods to aid them to manage customer relationship. In response to the needs, the term of CRM was born around 1997 (Bergeron, B., 2002. p.2).

2.2 Definition of CRM

Different from previous CRM means, such as direct mailing, this CRM is a means of managing customer-company relationship with computer-based tools.

Although CRM has become a hot topic increasingly, especially with the advent of E-commerce, it still hasn't had an unambiguous definition (Tan, X et al, 2002). Different people define the concept with different perspective.

Here we use the official definition on CRMGurn.com: "*CRM is a business strategy to select and manage customers to optimize long-term value. CRM requires a customer centric business philosophy and culture to support effective marketing, sales, and service processes. CRM applications can enable effective Customer Relationship Management, provided that an enterprise has the right leadership strategy, and culture.*"

From above definition, we can know CRM is a business strategy instead of only being a technology. As for technologies,

they provide informational and operational systems for CRM (Ling, R. et al. 2001, p. 83).

As Bergeron, B. (2002) stated that CRM is concerned with the dynamics of existing customer company relationship. The main aim of CRM isn't to attract new customers but to retain existing customers.

2.3Benefits of CRM

Companies make efforts to implement CRM effectively, because there are mutual benefits within CRM. The case of National Australia Bank is a typical sample. After implementing CRM, their profits have increased 28.7 percent during 6 months (Villanueva, J et al, 2002. p. 25).

After getting so attractive benefit, companies have more understanding about the opinion that customer-centric focus is the essential foundation of the CRM strategy (Ling, R. et al, 2001, p.83). In order to maximize benefits, they adopt information technology for gathering and processing customer data.

Generally, there are three key technology areas in CRM: Internet, customer call center and data warehouse (Shacklett, M., 2001). And Regalski, S. et al (2003, www.dmreview.com) pointed out, in order to get comprehensive learning about customers, companies integrate and standardize customer information using extract/transform/load (ETL) tools, enterprise application integration (EAI) tools.

With these means, companies can get useful customer information and make

analysis. As a result they can manage customer relationship better.

3. Importance of information

No matter what technologies are adopted, the first task of CRM is to capture customer data from several channels. Only after that, can companies analyze data and extract valuable knowledge.

Firstly, by analyzing customer data, such as customer transaction records, companies can identify which customers are profitable to them or not. Then companies can only pay attention on profitable customers.

Secondly, companies can learn customer behaviors and make decisions for future development trend. Consequently, companies can get expected return on investment and retain customers.

In order to make these, companies need to know much abut customers as possible. Indeed, obtaining enough customer data can provide help for companies. If the company only record one customer transaction data, they may look him as a non-profitable customer because of his limited profits for the company. So the company may dissuade continual business exchange. However, if the company has more information about him, they may learn the customer will graduate from law school, it's probably in the company's interest to keep the customer happy.

The sample proves sufficient customer information has great benefits for companies. Especially with the appearing of Web and E-commerce, the competition increases rapidly, companies have to provide personalized services. In order to exactly group customers into clusters, there are higher needs for data gathering.

However when companies gather customer information actively, especially within the e-transaction ear, the privacy issues have to be put forward.

4. Privacy issues

4.1 Overview

Privacy issues aren't new. Villanueva, J et al (2002) stated that customer attitudes towards privacy always are emotionally charged. They worry about what and how information is collected, used and shared.

Especially with the appearing of web, online transaction becomes more popular. Internet provides a rich means for businesses to obtain customer information. Consequently customers have more worries. In a recent survey of online consumers, over 65 percent were very or extremely concerned about maintaining their privacy after giving information over the Internet (Nykamp, M. et al, 2002, www.dreview.com).

4.2 Reasons for privacy concerns

It is reasonable for customers to have the concerns. Many facts prove that customers' normal life is interrupted because private information is known by others.

Before the advent of Web, people still can control this situation by refusing to provide personal information.

However, nowadays customers must provide some their information if they want to use the easy and fast purchasing channel--Internet.

Once information is given out, it will be recorded. After that, customers will be disturbed by endless e-mail or promotion magazines, even phone calling. When a people registers on a website for regular subscribe books, he usually has to provide one e-mail address and charge card number. Later, his e-mail box will be filled with spam, from unknown

organizations.

What's more serious, sometimes companies can know how many people in the family and where they go usually, and even where their children study. All of these make customer feel in danger.

The situation disturbs many customers. They don't want to waste time on those non-useful callings or letters. They also want to secure physical safe and to avoid embarrass. So they claim they want to protect their privacy.

4.3 Effects of privacy issues

Although customers strongly oppose the abusing of their information, they can't do anything to prevent companies. The only way is not to buy, especially to avoid online transaction despite with lower price, because comparing with providing information to an unknown website, customers prefer to let a people know it.

The situation has negative effects on good CRM. With fewer transactions, companies don't have enough opportunities to communicate and know customers. Especially decreasing online transaction, the channel of Internet can't make its function effectively. As a result, companies can't learn customers exactly and provide suitable services. This must affect companies' profits, too.

4.4 Necessity of alleviating privacy concerns

Unlike some years ago, companies should recognize privacy protection isn't an optional activity. The electronic technology has provided enough opportunities and effective ways to know and meet customers' requirements. Meanwhile it also has expanded rates of information abusing. Customers also have more awareness about privacy protection. Girard, D. (2000) once pointed that while Internet provides direct communications opportunities for companies, it also makes privacy a main concern in the customer's mind.

The following two points are main reasons for solving the problem.

(1).The dilemma situation

Nowadays many business companies fall into a dilemma situation. On the one hand, as Mckenzie, R (2002) stated Internet-powered customers request personalized services based on obtaining large amount of information. If they can't get satisfied services, they won't keep loyalty. A strong and visible customer privacy program can lead to customer loyalty.(Barney Beal, News Editor,02 Mar 2005).

On the other hand, with the responsibility of privacy protection, companies don't dare to take radical actions on information collection. Otherwise they will face the risk of invading privacy. One result is that customers distrust them any longer and give businesses to others. They must loss their competition in the market, too.

(2).Living on customer information

With rapid development of e-commerce, business companies have more dependence on customer information.

With collected information, companies can analyze customer behaviors and preferences. Then they can design characterized services for different customers. Only when they meet customers' requirements best and make customers happy, can they get more repeat customers.

And in e- commerce era, some websites make profits by providing products with collected customer related information. www.DoubleClick.com is a typical example. It collects and analyzes customer information in order to know what customers often do and what they prefer. With the information, it can develop tools for marketers to plan and analyze marketing programs so that marketers can make their marketing campaigns successfully. It is the reason why DoubleClick keeps the leading place of helping marketers reach customers in the highly competitive era.

So enough information is more vital for such websites. However with privacy concerns, these website can't be in normal operation at all because of lack of abundant information.

Facing these threats, companies should develop solutions for privacy concerns immediately. But what's more important, solutions must be effective.

4.5 Solutions for privacy issues

(1). Current solutions

In fact, many companies have fully realized customers are greatest assets. And effective protection of information is a key factor to keep assets with them and increase customer trust (Nykamp, M. et al, 2002, www.dreview.com). In this way company profitability can also be increased in the long run.

So many companies regulate privacy policies that ensure customer information can be protected without abusing. In website, all kinds of privacy statements are also published in order to get customer trust. However many of them aren't so effective as expected with following reasons:

✧   Changeable policies

Although many policies are regulated and also can make customers ease when providing personal information, these policies only can be kept in short period.

After some time, policies may be changed. The problem is more serious for online companies. For instance, AOL recently changed its privacy policy to allow to sell customer information (Bergeron, B. 2002. p.24).

Consequently, many online customers feel they can't verify their identity and purchasing records aren't sold to others.

✧   Ineffective statements

Currently when customers are asked to provide non-public information, they will receive certain privacy statements. These statements usually present personal information can be protected.

Actually, these statements don't imply that personal information can be treated as privacy (Loshin, D. 2002 www.dmreview.com). Contrarily, they only inform customers that their personal information can't be kept private. Usually the statements can list some organization names that can share the customer information.

With these statements, keeping information open seems correct and reasonable. As for customers, they don't have any options about it. They would think such statements they get is just like an inform letter for broadcasting their information.

(2).Proposed solutions

With so poor solutions, customers can't feel comfortable and safe at all. On the contrary, they will have more dissatisfaction. For companies, they also can be affected negatively. So they must treat the problem seriously and take effective actions.

Before companies adopt new and useful methods, they should keep clear ideas in their mind.

First of all, they should know resolving privacy problem isn't a form of words. Whiting, R. (2002) addressed that companies have the responsibility to make privacy work by adopting information technology and human training.

In additional, companies should have the awareness of investing capitals on improving privacy policies. Although the cost for privacy is hard to predict and count, usually the among is very large, they also should make the necessary investment Wise company leaders should know which is more valuable between certain amount cost and achieving long term customer trust.

Only with these ideas, can following proposed solutions help companies with their privacy problem.

✧   Visualizing collected information

When companies want to collect information from customers, they should inform customers in advance and want they know their information may be shared. Then customers can decide whether they want to give out personal information.

Even if customers have provided information, companies also need to let them know what the information is collected and how it will be used and who will share the information. And customers should control the use of information.

✧   Promoting understanding about privacy police

After privacy policies are regulated, the company should let customers understand and believe them. It is a valuable opportunity to build trust with customers. Companies can make this by website, e-mail or sales calls. The message must be simple and let customers know companies' understanding about privacy concerns.

✧   Increasing customer trust about the third party

Usually a business company has interaction with third party and information may be shared between them. And less confidence of customers with the third party also affects their trust with the company correspondingly.

So the company has the responsibility to provide enough confidence for customers and let them believe the third party is also obligated to protect the privacy.

Using information technology

In order to improve privacy protection, some technologies should be adopted. Especially in the web era, there are more risks of abusing information during online transactions.

Companies should adopt security system to prevent competitors invading their customer database. And when customer type their personal information over Internet, some technologies also should be used to allow customers choose whether they want information shared or whether they need these services.

✧   Government interference

Privacy isn't only business but also policy issue. So government should regulate legal policies to constrain privacy

protection.

In fact, some countries, such as U.S. and Canada, have published registration for privacy protection and get positive impacts. The PIPEDA of Canada effectively protects customer privacy and also provides a standard for business companies.

5. Conclusion

It is obvious that more companies have realized that customer is king and they have to provide excellent customer services for keeping a good customer-company relationship.

In order to make it, all business companies try their best to gather customer information and analyze them. However the privacy issues make the data gathering difficult.

Companies should know if privacy concerns aren't stated openly, customer trust could be diminished or eradicated. So they should make efforts to resolve for getting trust.

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Performance under Varied Management Styles – a Comparative Assessment of Engineering Education Programmes in India

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Abstract

This paper compares the performance of engineering education programmes in India under varied management styles. The comparison is based on the scores allotted to various engineering programmes by the expert teams of National Board of Accreditation, India. The study has been formulated on the statistical techniques of hypothesis testing and multiple comparisons on the performance scores of 160 programmes from various states of India. It is found out that the performances of Autonomous colleges are superior and autonomy helps in the improvement of process factors of the engineering programmes, especially for the Industry-Institute interaction and R&D activities.

Keywords: Performance comparison, Engineering programmes in India, Management styles of engineering programmes, Autonomous programmes

1. Introduction

The last three decades witnessed a lot of changes in industrial and educational fields. With rapid progress in the information and communication technologies, the demand for technical manpower in this area has also increased. This has resulted in setting up of a large number of institutions through out India, offering a variety of programmes to meet this demand. In terms of the magnitude of human resources, expertise available and of physical facilities created over the last three decades, the system of technical education of India has become a formidable reservoir of technical expertise in the global scenario.

The new economic policy regards expenditure on higher education as less of an investment of the nation in the future and more of a subsidy to a relatively affluent section of society. Many universities are currently facing the challenges of reorienting their approaches to be more customer-focused and conducting their activities in a more business-like manner (Hides et al., 2004). The adoption of a market-oriented approach in running education is said to have the consequences of adoption of the fee-paying principle and popularity of revenue generation activities (Mok, 2000). In order to reduce the burden on the government in educational provision, in many countries, public administrators consider economic factors the most important ones, and most of the time it is the economic considerations that drive individuals and shape social and public policy (Mok and Wat, 1998). The demand on technical institutions to sustain on their own without grant/support from the government has also increased. These changes have created a need for private resources and a new species of 'businessmen as providers of technical education' has emerged (Padmanabhan, 1999). Due to these policy reasons most of the new engineering colleges in India in the last decade started in private sector working under self-financing basis (AICTE, nd). The spontaneous growth in engineering education sector with a nominal control of Government has led to many quality problems. Some of these problems are inadequate supply of well qualified experienced faculty, too many colleges affiliated to a single university, location of many institutions far away from industry centers and lack of understanding between the Government & managements of self-financing institutions on the fee structure & admission processes. An analysis of performance of these institutions is of great significance in this situation and could help us identify some policy options to improve the quality of education.

2. Management of engineering institutes

Institutions offering engineering programmes in India can be broadly classified into four major categories, namely Autonomous, Government, Aided, and Self-financing colleges. These colleges work under different circumstances with different working styles.

2.1 Autonomous colleges: - Indian Institute of Technologies (IIT), National Institute of Technologies (NIT) and some other high profile colleges function as autonomous institutions in India. Most of them are 'deemed universities'. They enjoy academic, administrative as well as financial autonomy.

2.2 Government colleges: - Central and State Governments administer this second category of colleges. All India Council for Technical Education (AICTE), State Governments and Universities, to which these colleges are affiliated, fix pay scales and service rules for the staff employed in these categories of institutes. University is mainly responsible for the framing of rules for the academic part of these institutes. They frame course duration, subjects to be taught, examination pattern, and the grading system. Government, based on merit as well as reservations, carries out the annual process of student admissions.

2.3 Aided colleges: - Third category of colleges is coming under grant-in-aid sector. Education societies or private bodies are managing these institutes. They take up the responsibility of providing capital assets like land, buildings, etc. Government provides salary and other working expenses to these colleges. AICTE, State Governments and Universities, to which these colleges are affiliated, fix pay scales and service rules for the faculty and staff employed in these institutes. University frames the course duration, subjects to be taught, examination pattern, and grading system. Government and Management, based on merit as well as reservations, admit students to these institutes.

2.4 Self-financing colleges: - Fourth category of colleges is working fully under self-financing basis. Education societies or private bodies which take up the responsibility of running these institutes are mainly responsible for providing physical facilities, teaching staff and other supporting staff for these programmes. University frames the rules for the academic part of these institutes. Students are admitted partly from the merit list prepared by the government and partly from a list prepared by the management.

3. Some views on quality of engineering education

According to most of the leading experts on quality, attaining quality goals through a process of continuous improvement over time depends critically upon a firm's ability to define in specific performance terms what it means by quality and then to measure these performance variables objectively (Krishnan et al, 1993). Definition of indicators of quality and the objective measurement of these indicators are critical in the assessment of quality of engineering programmes. What is quality, quality of education especially engineering education, and how it can be achieved are of great interest to the stakeholders of engineering education. Quality in education has been defined variedly - even as, "fitness for purpose" (Tang and Zairi, 1998). Some authors (Angelo and Cross, 1993; Marra et al, 2000; Murray et al, 1996; Smith and Waller, 1997) have described quality as the combination of factors like knowledge of a realistic goal, sufficient faculty-student contact hours, a balance of intellectual standards & academic support, frequent updating of courses, promotion of creative thinking, strong customer focus, importance given to collaborative learning & life-long learning and a system thinking. The concept of quality when applied to higher education has been inconclusive (Cheng and Tarn, 1997; Pounder, 1999). Education quality can be viewed as the combination of the quality of input, process, and output of the education system (Eriksen ,1995). LeBlanc and Nguyen (1997) identified curriculum, physical evidence, responsiveness and access to facilities as the factors, which explain service quality of education. To survive in the highly competitive environment, according to Kwasniewski, and Wo´znicki (1998), an engineering education programme must have the essential features of flexibility and adaptability. Many opinions can be observed in the literature about the factors influencing the quality in engineering education. Some of them are teaching process (Cropley, 2003), University – Industry collaboration (Natarajan, 2003), role of management (Gopalan, 2003), student intelligence & interest (Mouly and Padmaja, 2003), excellence of teachers (Shrivastava., 2003), accreditation standards (Prem vrat ,2003), e-education (Maji, 2003) and proper documentation of activities (Jagdeesh, 2001). While attempting to integrate ideas from TQM with a systems approach, Cheng (1996), defines education quality as the character of the set of elements in the input, process, and output of the education system that provides services that completely satisfy both internal and external strategic constituencies by meeting their explicit and implicit expectations. It is clear from the above literature review that the quality of engineering education cannot be defined by any single factor or dimension. The authors have viewed quality as the combination of various factors. The definitions of quality involve the characteristics of input, process, output and multiple constituencies of an education institution. Hence, these multi-dimensional features should be taken into account while assessing the quality of engineering programmes.

4. Framework of the study

As far as Indian engineering education system is concerned, NBA (National Board of Accreditation) accreditation process is the official performance assessment mechanism. NBA has defined criteria and standards by which the strengths and weaknesses of individual programmes in an engineering institution can be judged. This study focuses on the information based on the NBA assessment scores and visiting team reports.

A previous study based on the accreditation process of National Board of Accreditation (NBA), India, led to the development of a Process-Resource-Outcome-Management (PROM) model for the assessment of performance of

engineering programmes (Viswanadhan, 2006). This model comprises of 19 factors (quality indicators) categorized under the four groups of Processes, Resources, Outcome and Management (Table 1). This model is adopted for the present study. The comparisons are made based on the performance under the four management styles in terms of the 19 factors in the four major groups.

5. Data description

It is decided to assess the performances of engineering programmes from the score sheets prepared by the NBA expert team during their visit to the Institutes for accreditation purpose. These score sheets are confidential documents, which are not accessed by the public. Pure random sampling is difficult when dealing with such confidential data. With the special permission from the NBA, accreditation scores of 160 programmes that have undergone NBA accreditation process during the period 2000 – 2003 (from January 2004 some major changes had been made to NBA criteria) have been collected for the study. The selected samples of 160 (engineering programmes) represent the cross section of Indian engineering education system (Table 2). The programmes belong to various colleges of 13 different states of India. Different expert teams assessed the programmes. All these factors ensure the randomness of the samples.

With reference to the Table 1 and NBA score sheet, it can be noted that the 19 factors encapsulate different number of variables with different weight distributions. Hence, the normalized variable scores are found out as a first step in measuring the performance of the four categories of programmes with respect to the 19 factors for the 160 programmes. Data under each category of programmes are observed and the outliers are removed.

6. Formulation of Hypotheses

Hypotheses are formulated in an attempt to analyze the performance of varied management styles of engineering programmes (Autonomous - AU, Government - G, Aided - A and Self – financing - SF) in India.

6.1 Main Hypothesis:

'Performance of engineering programmes is the same irrespective of the management style of the college'.

6.2 Sub Hypotheses:

Sub hypotheses for the detailed comparison of programme performance with respect to different factors are listed below.

1. Equal amount of participatory management (*PM*) exists in all the four categories of engineering programmes.

2. There is no difference in leadership efficiency (*LE*) between the four categories of engineering programmes.

3. Amount of management commitment to achieve goals (*CA*) is same in all four categories of engineering programmes.

4. Planning and monitoring (*Pln*) of engineering programmes are at the same level in all the four categories.

5. Financial resources (*FR*) of engineering programmes are at the same level irrespective of the category of the college.

6. Main physical resources (*MPR*) of engineering programmes are at the same level irrespective of the category of the college.

7. Supplementary physical resources (*SPR*) of engineering programmes are at the same level irrespective of the category of the college.

8. Faculty adequacy (*FA*) is at the same level in all categories of engineering programmes.

9. Adequacy of supporting staff (*SSA*) is the same in the four categories of engineering institutes.

10. There is no difference in the Performance appraisal and development (*PAD*) system in the four categories of engineering institutes.

11. There are no differences in the student intake (*SI*) in the four categories of engineering institutes.

12. Student Performance (*StP*) is at the same level in all categories of engineering programmes.

13. Same amount of Learning Facilities (*LF*) are available in all categories of engineering programmes.

14. Instruction, Evaluation & Feedback (*IEF*) is of the same standard in the four categories of engineering institutes.

15. There are no differences in the implementation of Academic calendar (*AC*) between the four sectors of engineering institutes.

16. Equal amount of Supplementary Processes (*SP*) are there in the four categories of engineering institutes.

17. There is no difference in the institute initiatives (*II*) for industry interaction in the four categories of engineering programmes.

18. Industry Initiatives (*IyI*) for interaction with all categories of institutes are the same.

19. R&D activities (*R&D*) are at the same level in all categories of engineering programmes.

7. Testing of Hypotheses

7.1. Processing of data

As the nonconstancy of error variances and nonnormality of error terms are observed while comparing the 19 factor scores of the four categories, different techniques are adopted for cleaning the raw data. They are given below.

1. When both nonconstancy of error variances and nonnormality of error terms are observed, *Box Cox transformation + ANOVA* is used.

2. When only nonnormality of error terms are observed *Kruskal Wallis test* is used

3. When only nonconstancy of error variances is observed, *weighted least square regression +   ANOVA* is used.

The details of the actions taken are also given in the Table 3.

7.2 Result of hypothesis testing

The null hypotheses are tested on all the 19 factors (transformed or raw factor scores depending on the situation). Results are summarized in Table 4.

With reference to the Table 4, ten out of the nineteen factors are different for the four categories at a significance level of 0.05. The hypotheses 5, 8, 11, 12, 14, 15,16,17,18 and 19 are rejected and hence the null hypothesis of equal performance under the four styles of management is also rejected.

8. Multiple comparison tests

Reasons for the rejection of hypotheses are not clear from the foregoing tests. A significant difference in any of the two populations will lead to the rejection of the hypothesis. Hence a detailed analysis is needed for the interpretation of the results. Multiple comparison tests have been conducted to find out the causes of rejection of the hypothesis. Wilcoxon rank sum tests are used for the non-normal data and t-tests with Hochberg multiple comparison adjustments (to control the family-wise error rate) are used for normal data. These tests are conducted for the ten factors which are significantly different for the four categories. Factors that are significantly different for the different categories of programmes are given in Tables 5. The mean values of all the nineteen factors associated with the different PROM groups for the four categories are displayed in Tables 6 to 9. Results and interpretations of the study are presented in the subsequent section.

9. Results and Interpretations

9.1 Process factors: All the Process factors are found to be significantly different under the four styles of management of the Programmes. Details are displayed in Table 5. Mean values of the process factors for the four populations are shown in Table 6.

Autonomous colleges are found to be good in almost all process factors in comparison with the other categories of programmes. Academic Calendar seemed to have been followed strictly in all categories of programmes. Instruction Evaluation and Feedback is also at good level in almost all categories. Supporting Processes like Supplementary Processes, Institute Initiatives, Industry Initiatives and Research & Development activities are at poor levels in all categories of programmes. Aided colleges and Government colleges are better in Institute Initiatives and Government colleges are getting more Industry Initiatives for interaction. Supplementary Processes are at high levels in Aided colleges in comparison with the other categories. Self-financing engineering colleges show the lowest level in Supplementary Processes. Research and Development activities are very limited in the under graduate engineering colleges, among which autonomous colleges are somewhat better (56%) and self-financing colleges are the weakest (32%).

The factors like location of the college, experience & exposure of the faculty and vision of the management might be influencing the level of these factors. Unavailability of postgraduate programmes might be reducing the chances of research work in most of these institutes. Inadequacy of faculty may also contribute to this situation.

9.2 Resource factors: Among the seven Resource factors, three are found to be significantly different under the four styles of managements. Table 5 gives the result of multiple comparison tests and Table 7 gives the mean values of the Resource factors for the four categories.

Adequacy of faculty is not a problem for Autonomous engineering colleges (79%) and Government engineering colleges. But, this is a major issue for Self-financing colleges. Only Government engineering colleges seem to be superior with respect to student intake. Aided programmes stand at the top with respect to the Financial resources. Government programmes seemed to be weak with respect to this resource.

9.3 Outcome Factor: The outcome factor of the programme 'Student performance' is significantly varying from categories to categories of programmes. Results of multiple comparison tests are shown in Table 5. Table 8 displays the mean value of the Outcome factor of each of the four management styles.

Student Performance is high in Government engineering colleges and Autonomous engineering colleges when compared to that of other categories of colleges. Self-financing programmes are the weakest in this factor also. Inadequacy of

faculty along with poor quality of incoming students might be the reason behind the poor performance of students in the Aided and Self-financing programmes.

9.4 Management Factors: There is no significant difference between the different categories of programmes with respect to Management factors (Table 5). Mean values of these factors are given in Table 9.

The study reveals that, in general, managements of engineering programmes are committed to achieve the goals and also have good leadership capacity. But the planning and monitoring mechanisms are not working properly and they are unable to create a work culture of Participatory Management. It can be suspected that the involvement of faculty in decision-making is very less and the powers are still centralized with the administrators. Performance Appraisal systems appear to be weak in engineering programmes irrespective of the categories. Quality control and improvement mechanisms might not be working satisfactorily in the engineering colleges and hence, intervention of external agencies like AICTE is essential to ensure a continuous of improvement of quality of education provided by these colleges.

10. Conclusions

In general, the performances of Autonomous colleges are found to be superior to those of other categories of programmes especially that of Self-financing colleges. Supporting processes like Supplementary Processes, Industry-Institute interactions and R & D activities, which promote informal interactions among the students and with the experts from various fields are inadequate in most categories of engineering colleges. The outcome of the programmes viz, Student Performance is not at a satisfactory level in most of the programmes. Any problem related to Resources is not visible from the study. Management of programmes can be treated only as average in terms of planning, participation and performance appraisal. More initiatives are needed to improve the Processes and Management, which ultimately may lead to the improved outcome of the programmes.

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Table 1. Factors and groups of PROM model

Seventy variables (Parameters) of NBA	Factors extracted	Major group
Decentralization and Delegation, Involvement of faculty, Transparency	1. Participatory Management	Management
Leadership, Efficiency, Attitude, Motivation	2. Leadership Efficiency	Management
Mission & Goals, Commitment and Effectiveness	3. Commitment to achieve goals	Management
Planning & monitoring and incentives	4. Planning and Monitoring	Management
Maintenance budget, Development resources and budget, Capital resources, Operational budget	5. Financial Resources	Resources
Office equipment, Hostels, canteen, transportation and medical facilities	6. Supplementary Physical Resources	Resources
Land, Building and Support services – water, electricity communication	7. Main Physical Resources	Resources
Attitudes, Involvement, Commitment, Skill Up gradation, Workload, Performance appraisal.	8. Performance Appraisal & Development	Management
Recruitment procedures, Number, Qualifications/Skills	9. Supporting Staff Adequacy	Resources
Recruitment procedures, number, qualification and development programmes.	10. Faculty Adequacy	Resources

Academic Results, Admission to Post Graduate Courses, Performance in competitive Examinations, Placements and Employer's Feedback	11. Student Performance	Outcome
Admission Criteria and number of admissions	12. Student Intake	Resources
Syllabus, Implementation of the Instructional Programme, Library, Computing facilities, Laboratories, Workshops, Modernization and Budget for Consumables	13. Learning Facilities	Resources
Instructional aides, Evaluation Procedures and feedback,	14. Instruction, Evaluation and feedback	Processes
Working days, contact hours/ week, announcement and implementation of academic programmes.	15. Academic calendar	Processes
Student Counseling and Guidance, Extra & Co-curricular Activities, Alumni Information, Professional Society Activities, Entrepreneurship Development	16. Supplementary Processes	Processes
Industry participation and curriculum planning, Consultancy, Continuing education and industrial internship for the faculty, Project Work	17. Institute initiatives	Processes
Extension Lectures, Industrial Visits and Training, Placement	18. Industry Initiatives	Processes
Institutional Budget for Research and Development, Academic/Sponsored/Industrial Research and Development, Publications and patents	19. R&D Activities	Processes

Table 2. Categorization of samples (Engineering Programmes)

Category of Engineering Colleges	Number of Programmes
1. Autonomous Colleges	39
2.Government Colleges	25
3. Aided Colleges	17
4. Self – financing Colleges	80

Table 3. Preparation of data for Hypothesis testing

	Anderson Darling Normality Test		Levene's test for Homogeneity of variances		Action taken
Factor	A squared	p-value	Test statistic	p-value	
PM	2.602	0	2.53	0.06	Box Cox transformation + ANOVA
LE	1.789	0	3.06	0.03	Box Cox transformation+ ANOVA
CA	9.512	0	1.304	0.28	Kruskal Wallis Test
FR	2.551	0	1.46	0.23	Kruskal Wallis Test
SPR	2.609	0	1.12	0.35	Kruskal Wallis Test
SI	1.561	0	2.85	0.04	Box Cox transformation + ANOVA
AC	2.608	0	0.67	0.57	Kruskal Wallis Test
LF	0.38	0.4	5.41	0.001	Weighted Least Square + ANOVA
FA	0.59	0.123	9.25	0	Weighted Least Square + ANOVA
StP	1.1	0.007	4.29	0.006	Box Cox transformation + ANOVA
IEF	0.52	0.18	5.51	0.001	Weighted Least Square + ANOVA
SP	2.39	0	2.61	0.05	Box Cox transformation + ANOVA
PlN	1.61	0	2.91	0.04	Box Cox transformation + ANOVA
MPR	2.24	0	2.4	0.07	Box Cox transformation + ANOVA
PAD	0.3	0.59	2.31	0.08	Weighted Least Square + ANOVA
SSA	0.61	0.11	2.12	0.1	ANOVA
II	0.71	0.06	0.42	0.74	Kruskal Wallis Test
IyI	0.35	0.47	2.26	0.08	Weighted Least Square + ANOVA
R&D	0.73	0.06	0.77	0.51	Kruskal Wallis Test

Table 4. Results of Hypothesis tests

Hypothesis testing			
Kruskal Wallis Test			
Factor	*Chi-square*	*Degrees of freedom*	*p-value*
Commitment to Achieve Goals	1.59	3	0.66
Financial Resources	9.45	3	0.023
Supplementary Physical Resources	11.84	3	0.08
Academic Calendar	15.26	3	0.002
Institute Initiatives	23.64	3	0
Research & Development	45.12	3	0
ANOVA Test			
Factor	*F*	*Degrees of freedom*	*p-value*
Participatory Management	1.14	3	0.34
Leadership Efficiency	2.25	3	0.09
Student Intake	2.95	3	0.04
Learning Facilities	1.54	3	0.21
Faculty Adequacy	11.8	3	0
Student Performance	18.37	3	0
Instruction, Evaluation & Feedback	1.97	3	0
Supplementary Process	3.67	3	0.01
Planning & Monitoring	.26	3	0.86
Main Physical Resources	2.25	3	0.8
Performance Appraisal & Development	1.68	3	0.17
Supporting Staff Adequacy	1.64	3	0.183
Industry Initiative	14.96	3	0

Table 5. Results of multiple comparison tests between the four categories of programmes

Significantly different Factors among various styles of management				
t-tests with Hochberg adjustments				
Factors	*Category (I)*	*Category (J)*	*Mean difference (I - J)*	*p-value*
Faculty Adequacy	Autonomous	Self-financing	10.51	0
	Government	Self-financing	6.86	0.011
Student Intake	Autonomous	Self-financing	30.07	0.023
Student Performance	Autonomous	Aided	8.61	0.03
	Autonomous	Self-financing	12.08	0
	Government	Aided	10.27	0.013
	Government	Self-financing	13.74	0
Supplementary Process	Aided	Self-financing	60.6	0.009
Industry Initiatives	Autonomous	Self-financing	38.08	0
	Government	Self-financing	40.14	0
Wilcoxon rank sum tests				
Factors	*Category (I)*	*Category (J)*	*W*	*p-value*
Financial Resources	Autonomous	Government	404	0.03
	Government	Aided	230.5	0.001
	Government	Self-financing	661	0.009
Instruction Evaluation and Feedback	Autonomous	Government	374.5	0.002
	Autonomous	Aided	36	0
	Autonomous	Self-financing	3179	0.002
Academic Calendar	Autonomous	Government	330	0.024
	Autonomous	Aided	55	0.028
	Autonomous	Self-financing	1673	0.001
Institute Initiatives	Autonomous	Self-financing	4129	0
	Aided	Self-financing	3674	0.002
Research & Development	Autonomous	Government	658.5	0.034
	Autonomous	Aided	325	0.004
	Autonomous	Self-financing	3783	0
	Government	Self-financing	3885	0.001
	Aided	Self-financing	3738	0.011

Table 6.   Mean values of Process factors in four categories of programmes

Category	Mean values of Process factors (%)					
	IEF	*AC*	*SP*	*IyI*	*II*	*R&D*
Autonomous	72	83	64	68	61	56
Government	67	78	63	69	56	47
Aided	70	75	70	60	61	52
Self-financing	68	78	60	57	48	32

Table 7. Mean values of Resource factors in four categories of programmes

Category	Mean values of Resource factors (%)						
	FA	*SSA*	*SI*	*FR*	*MPR*	*SPR*	*LF*
Autonomous	79	68	73	70	77	71	73
Government	76	71	98	63	82	62	73
Aided	73	66	80	73	89	64	70
Self-financing	69	66	80	70	77	62	74

Table 8. Mean value of the Outcome factor in four categories of programmes

Category	Mean value of the Outcome factor (%)
	SP
Autonomous	69
Government	71
Aided	61
Self-financing	57

Table 9. Mean values of Management factors in four categories of programmes

Category	Mean values of Management factors (%)				
	PM	*LE*	*Pln*	*CA*	*PAD*
Autonomous	64	69	63	71	60
Government	65	72	60	72	59
Aided	57	65	62	70	59
Self-financing	60	70	62	71	57

Study of Reverse Logistics in the E-commerce Environment

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Abstract

Application of electronic commerce promotes logistics development.With the market completion enhancing, corporations need decrease their costs and increase consummers' satisfaction. These problems make the reverse logistics' value exposed in modern logistics. From the classification and characteristic of the reverse logistic, this paper analyzes the reasons and the problems in the development of the reverse logistic, also gives out some symmetries on how to solove these problems.All this can make the reverse logistics in the electronic commerce develop.

Keywords: Electronic commerce, Reverse logistics, Develop

1. Introduction

With the rapid popularization of the Internet, the burgeoning of e-commerce, it brings a profound change for economy and society, the circulation closely related to is no exception. E-commerce and logistics are the complement to each other, logistics is the fundamental guarantee for e-commerce, and e-commerce is the future for the logistics, both tend to intergrate with the development of information technology. In recent years, the rapid development of e-commerce, breaks the boundaries of regional and national,then opens up a vast market of online business, modern logistics have a huge space for development. At the same time, e-commerce transactions can not be the object of experience, the buyer can only get commodities information from pictures , that often exists a certain degree deviation, so   in recent years , the returned volume of e-commerce   increases sharply. The lack of good return channels is the main reason for the customers to give up on-line transactions. Many well-known foreign companies take reverse logistics strategy as a important too to reduce costs, increase customer satisfaction and strength the advantage of competitive. As a result, e-commerce development can not leave the support of reverse logistics, and the efficient operation of the reverse logistics also need e-commerce.

2. Connotations and characteristics of reverse logistics

2.1 Connotation of reverse logistics

Reverse Logistics Executive Committee defined reverse logistics as: plan, implement and control the raw materials, semi-finished goods inventory, the finished goods and the related information, efficiently and economicly control the process flow from the consumption point to the start, in order to achieve the value for recycling and disposaling properly. Reverse Logistics include return reverse logistics and recovery reverse logistics.

2.2 Features of reverse Logistics

(1) Slow

The slow of reverse logistics is mainly reflected in the slow pace of accumulation on the amount of reverse logistics, the complexity of the dealing process, the slow recovery of recovery value.

(2) More beginning points.

The biggest difference between logistics and reverse logistics is that the different number of starting point and ending point. In the forward logistics, the products often move from a starting point to many destinations. On the contrary in the reverse logistics, products move from many starting points to one destination.

(3) Poor predictability.

In the forward Logistics, the business only need to predict the future market demand, each of the operating segments are based on market forecast, and the whole process is highly predictable. And reverse logistics is based on the reaction, it's usually not the plan or the result of the decision-making, but it's the reaction of consumers. Reverse logistics starts by the final individual consumer, and individuals in deciding return or not will be affected by many factors, so companies can not know how many products will return and the state of recovery. This has resulted in reverse logistics has greater uncertainty, is also more difficult to predict.

3. The reasons of reverse logistics development in e-commerce environment

3.1 Laws and regulations

In order to protect the environment and promote recycling of resources , at the same time in order to standardize the Web site and the protection of the right of consumers, many countries have legislation expressly provides that e-commerce sites must   take Return Policy.

3.2 The driven of competition

E-commerce have changed the business environment, With the large-scale e-commerce applications, return rate of transaction online has reached 36%. In today's market-oriented economic environment, customers' value is the key factor for the survival and development of business. So now more and more enterprises recognize the importance of the reverse logistics, in order to improve the customer satisfaction and enhance competitive advantage

3.3 Asymmetric Information

In the e-commerce model, customers often can only see the electronic images or electronic statement of the reference goods. From the visual perception of goods, customers can not fully understand the characteristics of the purchased goods, at the same time, the false information of goods has also increased the possibility of misleading. A large number of reverse logistics will generate When the goods received is different from the one seen in the Internet.

4. Problems of reverse logistics development in e-commerce environment

there are many same points between Reverse Logistics and the Forward Logistics, and also have the composition and logistics functions of Forward Logistics, that is: packaging, handling, transporting, storage, processing and other functions, but also its own characteristics. these characteristics make reverse logistics have enormous challenge.

4.1 Internal neglect.

Reverse Logistics has become an important part of management strategy in many foreign countries. In recent years, although many companies set up special recycling departments and reverse logistics recycling system, but we should clearly see that many companies excluded the reverse logistics from the activities of business strategy. No modern concept of reverse logistics, reverse logistics in the "foil" or "subsidiary" status, a significant number of enterprises see the reverse logistics as the burden ,see its expenses as the cost of additional business.

4.2 The higher complexity system

In the reverse logistics system, there is a high degree of uncertainty on the time and quantity in recovery process of the consumer or end-market , at the same time the Internal logistics of reverse logistics system reflect each other, this leading to reverse logistics system is   lack of effective control, thereby the complexity of the system is increasing .In addition, enterprises can not predict how many products will recovery and can not predict the condition of recovery, coupled with the high costs of delaying, so it is difficult for us to use many already existing e-commerce applications ,forecast technology and mathematical model in supply management.

4.3 The lack of experience in reverse logistics

Reverse Logistics in China has just started in the stage, especially in e-business environment, our logistics industry practitioners lack of reverse logistics management experience. For the conventional forward logistics, business usually has a perfect system of statistical analysis. However, reverse logistics, they found that I do not know where to start. how

many reverse Logistics? How to get the reverse logistics data? How to manage? IT enterprises also can't deal with these problems clearly, so these problems are often dealt with by hand, resulting in extremely low efficiency.

5. Analysis on how to develop reverse logistics in e-commerce environment

5.1 Business must strengthen attention of reverse logistics

Enterprise senior management should return full attention to reverse logistics and returns management, Business should strengthen the co-operation with retailers and service providers. Enterprise information management need speed up the pace, so that all the logistics business activities will be finished under the guidance of information system, in order to achieve timely and accurate feedback, analysis, forecast. Business should strengthen the staff's awareness of reverse logistics cost management, make costs reducing from the work of the reverse logistics management extended to all business sectors.

5.2 Zero return policy for some commodities.

Many network marketing companies sell the product which value is relatively low, or some one-time consuming goods, then the business and customers will lose much if the return policy is also taken, at this time a zero return is possibile. Business give discounts and Rangli for products, company no longer accept the return through this economic compensation. Businesses achieve zero returns that reducing management costs, consumers to buy their products on the Conditions the products can't be returned before they buy, so this reduced the possible disputes when return.

5.3 Establish appropriate supporting mechanism of talented people

Human resources are the source of development reverse logistics which can't be separated from the development of human resources planning mechanism. Human resource of reverse logistics is currently relatively weak, the total amount of small, the average level of education and title is low. It is difficult to adapt the needs of the development of reverse logistics. It is lack of some talents who have modern concept of reverse logistics, who is familiar with the operation of modern reverse logistics, who have the knowledge of this field and related businesses. So measures should be taken timely to plan efficient introducing mechanisms and reserving mechanism to meet the urgent needs of talents

6. Conclusion

Reverse Logistics is the e-commerce links which can not be ignored, for end customers, representing the credibility and image of business. Reverse logistics provides a platform for companies to better communicate with customers, The e-commerce environment is a more efficient tool and infrastructure for reverse logistics. With the further development of e-commerce, the reverse logistics will become a huge competitive advantage for e-commerce. Research on reverse logistics, set reverse logistics strategy, improve the reverse logistics system Will be benefit for the healthy development of e-business. China's e-commerce companies need to seriously study the phenomenon of reverse logistics, pay attention to the value of reverse logistics, Build e-commerce reverse logistics system.

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Corporate Social Responsibility Disclosure

in an Emerging Market: A Longitudinal Analysis Approach

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Abstract

This study provides empirical evidence on Corporate Social Responsibility Disclosure (CSRD) practices in Malaysia. It uses longitudinal data analysis for the period 1999 to 2005, and, a sample size of 200 firms chosen from the highest market capitalisation of public listed companies on the Bursa Malaysia. The results of the analysis reveal that CSRD received modest attention from most surveyed companies in their annual reports, in terms of allocated space and subjects covered. The themes generally disclosed across the four categories were employee relations and community involvement, whereas, environmental disclosure requires much more attention from Malaysian firms. Findings were supported by previous studies that CSRD is at an emerging stage for Malaysian public companies.

Keywords: Corporate Social Responsibility Disclosure (CSRD), Content Analysis, Bursa Malaysia

1. Introduction

In the last decade Corporate Social Responsibility (CSR) is an issue that has increasingly attracted attention from the business, political, and public spheres (Brammer, and Palevin, 2004). In emerging capital markets, such as Malaysia, this issue also tends to be a strategic issue for public listed companies. Malaysian firms incorporate CSR into their corporate governance agenda to become good corporate citizens in the Malaysian capital market.   They also seek to increase the pool of enhancement in the recognition and profile of corporate domestic firms who can gain better recognition from the perspective of international and local investors. Furthermore, the push towards better CSR practices is also important to be consistent with the overall national agenda, particularly in achieving Vision 2020, meeting the objective of the National Integrity Plan and as a tool for generating greater economic and capital market growth (Corporate Governance, 2004).

Currently CSR is an important factor, since the greater a firm's disclose of CSR activities, the better its performance will be. For instance, if a firm's report on its CSR activities is inadequate it will face little nuisance with the stakeholders, as both investors and customers pay increasing attention to companies involved in CSR activities. In general, CSR embraces all organizational activities relating to the organization and society. These may include; employees support (safety, job security, profit sharing, employee participation, treating employees fairly and equitably etc.), community support (activity involved in education, health and housing related supportive activities, philanthropic activities), product/services support (product/service quality, product safety, delivery, research and development etc.), and environmental support such as; sustaining the eco-friendly environment, producing environmentally friendly products, waste management, recycling etc. (Staples, 2004; and Sen and Bhattacharya, 2001).

Although some Malaysian firms have been recognized as being pro-active in this field Corporate Social Responsibility Disclosure (CSRD) appears to be in its infancy in Malaysia (Tsang, 1998, and Thompson and Zakaria, 2004). Some of these firms have voluntarily adopted the Global Reporting Initiatives (GRI) reporting framework (for example, BAT Malaysia Berhad and Shell Refining Co). Recently, corporate governance studies appear to indicate that there are ample opportunities for improvement for Malaysian firms in this area (BEIM, 2004).   Hence, a proactive approach to CSR practices may help firm reach pools of capital it might not otherwise be able to tap into.   By the same token, being well-known for adopting socially responsible policies may help a firm capture export business to supply firms at the top end of the global supply chain where CSR practices is taken seriously (Investor Digest, 2003).

This study reports and analyses CSRD through content analysis for Malaysian companies listed in Bursa Malaysia. This study is different from prior studies on CSRD in a Malaysian context, in two ways. First, this study has explored using longitudinal data analysis, and second, it explores the different categories of CSRD analysis among industries.

2. Prior Studies of Corporate Social Responsibility Disclosure (CSRD)

The literature in previous studies uses different categories to classify CSRD practices (Thompson and Zakaria, 2004; Abu-Baker and Naser, 2000; Tsang, 1998; and Gray, Owen, and Maunders, 1987). These categories were mainly divided into five major areas – environment, energy, community involvement, products and employees/human resources. Prior studies in CSRD have taken two broad approaches. While some studies examined the extent of CSR (e.g. Abdul Hamid, 2004; Thompson and Zakaria, 2004; Nik Ahmad, Sulaiman, and Siswantoro, 2003; Che Zuriana, Kasumalinda, and Rapiah, 2002; Kin, 1990), others have examined the identified driver or other factors (Amran and Devi, 2007; Ramasamy and Ting, 2004; Rashid and Ibrahim, 2002; and Teoh and Thong, 1984). The findings of previous CSRD studies in Malaysia (see Abdul Hamid, 2004; Thompson and Zakaria, 2004; Nik Ahmad and Abdul Rahim, 2003; Che Zuriana *et al.*, 2002) state that the level of awareness appears to be growing.

The majority of studies on CSRD, especially in the emerging capital markets, use content analysis. Following previous studies, this study will also utilize annual reports as a principle focus of the firm's disclosures (e.g. Thompson and Zakaria, 2004; Abu-Baker and Naser, 2000; Alnajjar, 2000; Abbort and Monsen, 1979). According to Gray, Kouhy and Lapers (1995) annual reports are broadly viewed as the main official and legal document, which are produced on a regular basis and act as an important place for the presentation of a firm's communication within political, social and economic systems.

For example, Abu-Baker and Naser (2000) used four (5) testable dimensions. They tested their hypothesis on empirical evidence on CSRD practices in Jordan. They found that a significant majority of the surveyed companies (90 percent) disclosed social responsibility information concerning human resources and 80 percent disclosed information relating to their involvement with the community. However, Abu-Baker and Naser (2000) found that a limited number of companies disclosed information concerning products, environment, energy, or other social items. A significant number (45 percent) of the manufacturing companies adopted a mixture of monetary and non-monetary quantification. The vast majority of companies (90 percent) placed the disclosed information on their CSR activities in audited financial statements. Lastly, banks and financial companies disclosed a weighted number of 0.67 pages, followed by manufacturing companies, which disclosed an average of 0.52 pages. In Malaysian context, Thompson and Zakaria (2004) found that 81.3 percent of the 257 companies investigated for the year 2000, included social disclosure in its annual reports. They also found that most of the firms made disclosures on employees and human resources (40 percent), products and consumers (24 percent) community involvement (22 percent) and environment only 16 percent.

The content analysis employed in this study presumes that content categories identified in the written messages of the annual reports have evidence, meaning that they can be classified. According to prior studies, Abu-Baker and Naser (2000) and Thompson and Zakaria (2004) used six categories of themes for content analysis – environment, energy, human resources, products, community involvement, and others respectively. These can be compared with the KDL's performance definitions of the six attributes of social measures used by Waddock and Graves (1997), which included: customers, employees, community, environment, minorities and non-U.S. stakeholders respectively (Venrschoor and Murphy, 2002). However, if more than one category is subject to content analysis, a more complex level of measurement may be achieved through the summing of the results for each category. Thus, according to the previous study by Abdul Hamid (2004) on content analysis of CSRD in the emerging capital markets, this study will use four types of CSRD, namely employee relations, community involvement, product dimensions, and environmental performance. Measuring attributes of CSRD scores is adopted from Al-Tuwaijri, Christensen, and Hughes (2004), who used quantitative disclosure measures, which have assigned weights to different disclosure items based on the perceived importance of each item to various user groups.

There are a variety of media or documents for CSRD (Jenkins and Yakovleva, 2005), which include: Advertisements or articles published detailing a company's activities; Annual Reports; Booklets or leaflets to address the social activities of the company; CD reports; Community reports; Environmental reports; Labelling of products to promote environmental and other concerns; Press releases; Supplements to the Annual reports produced at interim dates; and Video tapes and Websites. In this study, the main information to evaluate CSR activities is the annual report published by the companies listed on Bursa Malaysia. Annual reports are the most publicized and reported by companies (Tilt, 1994 and Jenkins and Yakovleva, 2005). The focus of analysis on the corporate annual reports is also consistent with prior social disclosure studies. This occurs when the corporate annual reports are the main media for corporate communication, and, particularly in the case of quoted firms is widely available (Adams and Harte, 1998). Furthermore, Zeghal and Ahmed (1990) explicitly recognized that annual reports are not the only medium through which firms can report their socially responsible behaviour, and for many activities, other media enables more timely communication to a larger number of stakeholders.

3. Research Method

The initial sample in this study consists of the 200 largest companies, selected from the 494 companies listed on the main board of Bursa Malaysia, for the period 1999 to 2005. The selection is based on their highest market capitalisation ranking. This selection criterion is consistent with previous studies on corporate social responsibility reporting (e.g. Thompson and Zakaria, 2004; Hackston and Milne, 1996; and Guthrie and Parker, 1990). Tsang (1998) found that a higher proportion of large and medium-sized companies disclosed social information compared to small companies.

Data for these companies was collected for the years 1999 through 2005. The time span was selected for two reasons: First, this period was the recovery period from the financial crisis that hit the Asian countries and particularly the Malaysian capital market. Second, CSRD is in its infancy period in the emerging capital market (Tsang, 1998 and Thompson and Zakaria, 2004). Data was collected from the companies' annual reports through the companies' websites.

The content analysis approach was used to explore the number of companies that reported their CSR activities. Abbort and Monsen (1979:504) made the statement "content analysis is a technique for gathering data that consists of codifying qualitative information in anecdotal and literary form, into categories in order to derive quantitative scales of varying levels of complexity".

Measurement of CSRD in this study adopts a similar disclosure-scoring methodology based on content analysis. Items selected for inclusion were based on their relevance to the Malaysian context, and these were classified into four indicators of CSRD namely: (1) employee relations; (2) environment; (3) community involvement; and (4) product. Each indicator has sub-item disclosures that are adjusted based on whether the items are disclosed. Furthermore, Al-Tuwaijri *et al.*, (2004) proposed that the process may be achieved using quantitative disclosure measures with denoted weights for different disclosure items. These are based on the perceived importance of each item to various user categories, which also marks the greatest weight '3'for quantitative disclosures related to the four CSR indicators or categories. Marking the next highest weight '2' for non-quantitative but specific information related to these indicators. Lastly, common qualitative disclosures receive the lowest weight '1'. Firms that do not disclose any information for the given indicators receive a zero score.

4. Results of Content Analysis

Table 1 shows the Malaysian companies that reported their CSRD are divided into four dimensions of CSR. The employees dimension ranges from 64 to 92.5 percent of the sample size of 200 companies providing assistance/benefit for their employees during the four year analysis. For example, firms providing assistance or guidance to employees who are in the process of retiring or who have been made redundant; providing staff accommodation or staff home ownership scheme, and providing recreational activities or facilities.

The second highest is employee share purchase schemes ranging from 30 to 54 percent. The objective Executive Share Option Scheme (ESOS) programme for executive employees is to make them more responsible in running their business because the firm is also their own. The training and education programme is also an important part for employees, ranging from 15 to 24 percent. Most of the firms disclose their companies training programme for the following – training employees through in-house programme; and giving financial assistance to employees in educational institutions or continuing education courses.

Lastly, employee profiles are also an important part of CSRD. The number of firms that disclosed this dimension was between 3.5 to 31 percent of the total sample. The companies reported their employee profiles as follows – providing the number of employees in the firm and/or at each branch/subsidiary; providing the occupations/managerial levels involved; providing statistics on the number of staff, the length of service in the company and their age groups; and providing information on the qualifications of recruited employees.

For the community involvement dimension, charity programmes were the most popular ranging from 14 to 44 percent, followed by cash donation programmes, ranging from 11.5 to 18 percent of the 200 sample size. Next, supporting national pride or government sponsored campaigns ranging between 7 to 14 percent and lastly, ranging between 5 to 14 percent were scholarship programmes that are also popular for companies as a proof of their concern for the community.

For product dimension, most companies reported their CSR in product development ranging between 12 to 27 percent of the 200 sample size. Product development includes information on development related to a firm's products, the amount/percentage figures of research and development expenditure and/or its benefits, and information on any research projects set up by the firm to improve its product in any way. Percentage of product quality disclosure ranged from 8 to 25.5 percent. These involved information on the quality of the company's products as reflected in the prizes/awards received (for example ISO 9000). Lastly, product safety disclosure ranged between 1.5 to 5.5 percent of the 200 sample size.

Pollution control was the most popular in the firms' annual report, which ranged between 3.5 to 15 percent of the 200 sample size. Pollution control in the context of the business operation was as follows; capital, operating and research and development expenditures for pollution abatement; statements indicating the firm's operations are non-polluting or that they are in compliance with pollution laws and regulations; and statements indicating that pollution from operation has been or will be reduced. Conservation of natural resources and using recycled materials are second highest with an average percentage ranging between 3 to 10.5 percent of the sample. Lastly, percentage of prevention or repair of damage to the environment resulting from processing or natural resources ranged between 3 to 9 percent of the 200 sample size. Besides, the ISO 14000 certificate that the ACCA Malaysia Environmental Reporting Awards (MERA) launched. The major aim of the award scheme is to appreciate voluntary environmental and social disclosure among Malaysian firms. Through this award the government hopes Malaysian firms will take environmental reporting more seriously (Thompson and Zakaria, 2004).

The number of companies that reported their CSR activities in at least one dimension during the period 1999 to 2005 was as follows: 128 (64 percent), 162 (81 percent); 170 (85 percent); 184 (92 percent); 185 (92.5 percent); 154 (77 percent) and 164 (82 percent) respectively. However, only 22 out of the 200 Malaysian companies reported consistently about their CSR activities in their annual reports.

Table 2 shows the results based on the number of sentences and pages of 22 Malaysian companies, which reported their CSR activities during the period 1999 to 2005. Findings obtained show Golden Hope Plantations Berhad was the first for the highest number of sentences and pages disclosed its CSR activities. The second highest was Telekom Malaysia Berhad followed by Shell Refining Company (M) Berhad, IJM Corporation Berhad, Highland and Lowland Berhad and BAT (M) Berhad. Next, the Trading and Services sector had the highest number of reports, second highest was the Consumer Products sector followed by Plantations, Construction, Finance, Industrial Products and Property sector.

For instance, Golden Hope Plantations Berhad has been reporting on its various corporate social activities in its company's annual report. This is elaborated in the following four dimensions of CSR:

Employee relation dimension

Golden Hope has the highest number of sentences and pages of reporting for the various related social activities during the period under analysis. Until the end of 2005, based on the company's statistics, the total manpower strength, group wide, was as follows: Operations 16,798 (85%); Non-executive staff 2,108 (11%); and Executive staff 762 (4%). There were many activities related to the employee relation dimension as follows: The training centre is to provide in-house training to employees. The average number of days of training per employee achieved is 1.5 days per employee. Golden Hope also applies the job evaluation and competency assessment process based on the Hay Job Evaluation System.

The company continued to promote welfare interaction including hosting a Workers' Day for all employees at Carey island. In recognition of the full commitment and dedication of employees to the group, a Long Services Award for employees was presented, for example, eight employees who had served the Group for 30 years were presented with Long Service Awards at the Putrajaya Marriot hotel in conjunction with the Company's dinner in October, 2002. In order to inculcate a safety culture, the Group closely monitors the establishment and activities of the Occupational Safety and Health Committee (OSHC) for all operating units.

Community involvement dimension

For community involvement activities, Golden Hope initiated the establishment of an agricultural and resources based museum in Carey Island that will initially showcase Golden Hope heritage. BERKESAN (Badan Kebajikan Kakitangan Islam Golden Hope) organizes talks and activities to promote well-being among Muslim employees and greater awareness of Islam to Group employees. The group sponsors lawn bowls, cricket and golf tournaments and other competitions. The company also provides financial support for employees' children and the public with the provision of a budget ranging from RM1 million to RM1.7 million. For example, during year 2002 the scheme awarded 89 scholarship and grants, of which 51 were awarded to scholars at various local institutions.

Furthermore, Golden Hope embarked on infrastructural developments within its estates, for the convenience of estate workers and those living in the surrounding neighbourhoods. Golden Hope also built proper roads at Welch Estate, Jementah, Johor for use by the general public. In Indonesia, for example Golden Hope built bridges, schools, community halls and proper roads; all to be used by the general public and workers. Aside from undertaking activity-based events, Golden Hope is also actively involved in giving donations and providing assistance to various needy bodies. For example, the company donated an ambulance to Tabung Haji. Other recipients of donations included Pusat Perubatan Universiti Malaya, Yayasan Sultanah Bahiyah and the Prime Minister's Hibiscus Award.

Product dimension

In Golden Hope, Research and Development activities cover various aspects of research on oil palm, rubber and other crops. For example, to improve Oil Extraction Rate (OER) and kernel recovery efficiency and to extract carotene

directly from oil palm fresh fruit bunches (FFB). Since the first innovation campaign was launched in 1993, a total of 586 innovations have been received and many of these have been commercialized. Golden Hope quality certification scheme is integrated with ISO 9001, ISO 14001 and OHSAS 18001 systems.

In short, Golden Hope Total Quality and Environment Management System (TQEMS) journal during the period of analysis is as follows: Occupational Safety and Health Management Manual, Golden Hope TQEMS V.1 (2000) and GH QCS V.1 (2000); Food Safety Assurance System or HACCP Certification Programme (2001); Forest Stewardship Council (FSC) for Group Estates; OHSAS 18001 Certification, Upgrading to ISO 9001; 2000, Golden Hope Juara or Black Belt Programme and Golden Hope TQEMS V.2 (2003).

Environment dimension

Golden Hope became the fourth Palm Oil Mill to receive the prestigious MS ISO 14001 Certificate for Environment Management System. It has continued to collaborate with the Department of Environment (DOE) to organize Students Environment Awareness Camps. A number of students from the Federal Territory and Selangor have participated. Golden Hope also organized an Environment Awareness Camp for its employees and their dependents. Other activities were also actively carried out as participants such as participating in the Minggu Alam Sekitar Malaysia Exhibition.

4.1 Descriptive Statistics for CSRD

This section shows the descriptive statistics of the CSRD score, based on their items of CSR as reported in Table 3. Findings in Table 3 show that human resources disclosure has the highest disclosed with a mean of 0.70, a median of 0.67 and a standard deviation of 0.43. These rates show that firms listed in Bursa Malaysia are more concerned with their human resources compared to the other dimensions. There were an increasing number of firms that disclosed their employee relations in their annual reports.

This was in contrast to the environment, which was less disclosed. It was reported as having a mean and median of 0.19 times and 0.00 time respectively. There is a guideline on environmental reporting for Malaysian firms (ACCA, 2003). However, there is no statutory requirement for public listed firms to disclose environmental information to the public in Malaysia. Consequently, the number of companies that made an environmental report was low. According to Perry and Sheng (1999), there are three major reasons why the firms report less on their environmental activities. First, the perception that their firms did not have an impact on the environment; second, the lack of advantage gained in terms of status or respect to consumers or within the business community, and *last*, there is little pressure from the government.

As improved economics has also raised the level of education in Malaysia, there is apparently increased public concern and awareness of the impact on the environment by business activities (Haniffa and Cooke, 2005). This may also be caused by the prominent role played by NGOs like the Association of the Protection of the Malaysian Environment and *Sahabat Alam Malaysia* (SAM), in lobbying for conservation and conservation of the environment. Further, Haniffa and Cooke found that the tight supervision of the media and greater coverage of environment issues, for example, cases of open burning, haphazard land and hill clearing, and poisonous waste were dismissed generating the public's concern for the damaging effect of the activities of the firms on the natural environment.

Incentives from the government like provision of prizes or awards such as the Malaysia Environmental and Social Reporting Awards (MESRA) and pressure from other stakeholders may change the perception of firms. ISO certification has some level of influence towards voluntary environmental reporting behaviour among Malaysian firms, specifically on 'pollution abatement' and on other issues related to environmental information (Sumiani, Haslinda, and Lehman, 2007).

Results in Table 3 support prior studies by Abu-Baker and Naser (2000) and Thompson and Zakaria (2004). For example Abu-Baker and Naser (2000) found that the majority of companies disclosed social responsibility information concerning human resources and community involvement, followed by product, environment and energy. Whereas, Thompson and Zakaria (2004) reported that most companies made disclosures on human resources followed by product, consumer, community involvement and the environment.

4.2 Descriptive Statistics for CSRD Based on Industry Sector

Table 4 reports that there are six sectors namely Consumer Products, Finance, Trading and Services, Plantations, Construction, and Infrastructure that have a mean above the overall sample and that four sectors, comprising of Industrial Product, Properties, Technology, and Hotels have a mean less than the overall sample (1.4661). The mean or average value is the most commonly used measure for central tendency. It is used to estimate the mean value when the data has been collected using an interval or ratio scale (Malhotra, 2004).

Table 4 also shows that the Plantation sector has the highest proportion of companies disclosing CSR activities during the years 1999 to 2005 and the Property sector has the lowest proportion. All industries have a minimum value of CSRD score which is 0.17 and the Plantation industry has the highest maximum value CSRD score of 11.58. These findings are contrary if compared with a previous study by Andrew, Gul, Guthrie, and Teoh (1989), which studied

annual reports of publicly-listed companies in Malaysia and Singapore for the year December, 1983. They found that the banking and finance industry had the highest proportion of CSR disclosing companies. This is reasonable, because the number of plantation companies listed in Bursa Malaysia has increased and they are also more concerned about disclosure of CSR activities in their annual reports.

Skewness is the tendency of the deviations from the mean to be larger in one direction than the other. Although all of the industries have a positive skew the Property sector is not normally distributed as it has the highest deviation with its skewness value of 4.3056. Kurtosis is the measure of relative peakedness or flatness of the curve defined by the frequency distribution (Malhotra, 2004). All of the industries have a positive value of kurtosis that indicates the distribution of the mean shows more peakedness rather than a normal distribution. Comparing the distributions of CSRD score among the seven industries, the Consumer Products sector tends to be normal.

The property industry has an extremely high positive kurtosis value (29.0521) as one of companies in the property industry, (Island & Peninsular Berhad), only reported its CSR activities completely for the year 2002, but did not for the other years. As the conclusion of CSRD score indicates that the Plantation (PL) industry has the highest mean value (2.0872) and maximum value (11.58) compared to the other industries, this indicates that the plantation industry is disclosing more information about their CSR activities for the period 1999 to 2005. These plantation companies are heavily monitored by stakeholders, especially NGOs, government and overseas customers, but detailed reasons need to be investigated for the companies in future research.

5. Discussion and Conclusion

Testing of data covered a sample of 200 companies, extracted from 494 companies listed on the main-board of the Bursa Malaysia, for the period 1999 to 2005. These companies constitute more than 90 percent of the total market capitalisation. CSR findings obtained support that the situation in Malaysia is at a nascent stage with respect to the disclose CSR activities. Results of content analysis revealed that CSRD involved four categories for Malaysian companies. Providing assistance and/or benefit for employees showed the highest percentage of disclosure in the employee relations dimension. Meanwhile, charity programmes were most popular for the community involvement dimension followed by cash donation programmes. Product development is the largest part engaged in the product dimension of CSRD. Lastly, pollution control was broadly reported in environmental dimensions. Referring to descriptive statistics, the employee dimension has the highest disclosure. The product dimension is the second highest, followed by community involvement and the environmental dimension.

Employee relations are the highest disclosed, followed by product, community involvement and environmental dimensions. These findings reveal that Malaysian public companies are more concerned with their human resources than for the other dimensions. Comparing the industry analysis the Plantation sector has the highest disclosed with the Infrastructure sector second, followed by Consumer Product, Construction, Trading and Services, Finance, Industrial Product, Properties, Technology and Hotels, respectively. There are four industries (Finance, Trading and Services, Construction, and Technologies), which have a higher risk than market risk. According to portfolio theory this indicates that investors have a chance to invest in these industries with a high return and volatility.

The numbers of companies that reported their CSR activities on at least one dimension during the period 1999 to 2005 fluctuated but tended to decrease. These conditions occurred because most of the activities in their employee relation dimension, such as share option programme for employees, were finished in the year 2003. Therefore, only 22 out of 200 Malaysian companies reported consistently about their CSR activities in their annual reports.

This finding signifies that companies should care about CSRD in their annual reports because even though certain companies have been involved in social activities they still do not expose such activities in their annual reporting (Amran and Devi, 2007). Hence, based on these results, companies have to pay attention to their social activities and reporting. According to arguments of slack resource theorists, increased CSR activities are followed by better financial performance (Waddock and Graves, 1997). Furthermore, they stated that when companies have slack resources, the better is their social responsibility as these resources have the chance to be distributed into the social domains.

Apart from addressing various pressures to be socially responsible, some reasons companies disclose their CSR activities in the companies' annual reporting are as a decoupling strategy for Malaysian companies to follow their business associates from the overseas which are already applying CSRD (Thompson and Zakaria, 2005) and try to be good corporate citizen to get contracts from the government (Amran and Devi, 2007). Another reason why Malaysian firms should be concerned with better CSR performance is to make the company attractive to foreign funds by showing that generally the cost of capital in foreign markets are cheaper than the local market. Thereby, helping firms grow their business faster and profitably. CSR provides a good start of differentiation for the firm's image; making it easier to recruit and retain key employees who are essential to sustain the business success (Investor Digest, 2003). Nevertheless, recent surveyed by Bursa Malaysia revealed that Malaysian public listed companies were far behind international standards since a lack of knowledge and awareness in incorporating CSR policies and disclosures in their

business activities (Jason NG, 2008). Based on these facts there is a need to find different ways to support companies in enhancing the awareness level as well as helping companies to actively become involved in CSR activities and disclosure thereof. The trend in developed markets such as North America and Europe shows there have been widespread empirical tests of the relationship between CSRD and companies' financial performance.

Some limitations of the study and recommendations on how to overcome them are elaborated as follows. First, this study uses content analysis in which methods deployed are subject to human error and this should be taken into consideration concerning what has been judged as representing CSRD (Thompson and Zakaria, 2004). This study only focuses on disclosures in the annual reports of firms although it is known that firms utilise other mass communication mechanisms. Hence, future research may consider other media for disclosure such as the firms' stand-alone reporting, in-house magazines, newspapers, and web-sites. Second, another source of limitation is the sample size for this study, which was taken from the 200 highest market capitalisations of companies listed on the main-board of Bursa Malaysia. The inclusion of medium-sized firms in the future may possibly improve results. Third, these findings should be interpreted with wariness, given that this study has only considered the evaluation for seven years. For any longitudinal study for future research in this area, it would be necessary to extend the number of periods studied under the evaluation of recent legal requirements. Last, it is highly recommended that future studies should also collect primary data through interviews. Thus, using a survey would be useful to determine more precisely the motives and perceptions of managers towards the disclosing of CSR activities.

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Table 1. Corporate Social Responsibility Disclosure (CSRD) in the Malaysian Companies' Annual Reports

CSRD dimensions	1999		2000		2001		2002		2003		2004		2005	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Employee:														
1. Health and Safety	10	5	15	7.5	24	12	29	14.5	32	16	17	8.5	26	13
2. Training and Education	30	15	39	19.5	46	23	46	23	48	24	45	22.5	46	23
3. Employees benefits	128	64	162	81	170	85	184	92	185	92.5	154	77	164	82
4. Profiles of employees	36	18	50	25	62	31	62	31	23	11.5	13	6.5	7	3.5
5. Share option for employees	60	30	94	47	107	54	107	53.5	101	50.5	67	33.5	80	40
6. Award for H&S programme	1	.05	4	2	5	2.5	3	1.5	8	4	2	1	3	1.5
7. Others	5	2.5	24	12	16	8	30	15	38	19	30	15	35	17.5
Community involvement														
1. Cash donation programme	27	13.5	23	11.5	24	12	34	17	36	18	40	20	52	26
2. Charity programme	31	15.5	30	15	34	17	29	14.5	28	14	56	28	55	27.5
3. Scholarship programme	13	6.5	10	5	20	10	28	14	26	13	17	8.5	29	14.5
4. Sponsor for sport activities	16	8	8	4	13	6.5	14	7	17	8.5	19	9.5	13	6.5
5. Supporting national pride	14	7	14	7	14	7	14	7	19	9.5	20	10	24	12
6. Public health project	5	2.5	10	5	12	6	18	9	24	12	10	5	5	2.5
Product														
1. Product development	24	12	34	17	44	22	54	27	44	22	41	22	54	27
2. Product safety	5	2.5	3	1.5	6	3	11	5.5	5	2.5	4	2	14	7
3. Product quality	16	8	30	15	31	16	51	25.5	48	24	28	14	34	17
Environment														
1. Pollution control	7	3.5	17	8.5	28	14	24	12	30	15	7	3.5	18	9
2. Prevention/reparation programme	8	4	6	3	12	6	14	7	17	8.5	19	9.5	21	10.5
3. Conservation and recycled materials	6	3	15	7.5	13	6.5	17	8.5	18	9	4	2	13	6.5
4. Award in environment programme	4	2	3	1.5	7	3.5	4	2	9	4.5	7	3.5	9	4.5

Notes: n = number of firms making at least one disclosure at the given category
 % = number of firms making at least one disclosure as percentage of total number of firms in the sample (200).

Table 2. Corporate Social Responsibility Disclosure of Selected Companies

No	Company name	Sector	1999		2000		2001		2002		2003		2004		2005	
			1	2	1	2	1	2	1	2	1	2	1	2	1	2
1	BAT(M) Berhad	CP	27	2	29	2	39	3	104	5	144	7	154	7	152	7
2	Proton Berhad	CP	13	1.5	15	2	20	2	16	2	43	3	-	-	-	-
3	Nestle Malaysia Berhad	CP	24	3	3	1	15	1	55	11	61	9	110	7	201	14
4	UMW Holdings Berhad	CP	3	1/2	57	4	64	7	74	6	68	4	83	6.5	9	6
5	F&N Holdings Berhad	CP	5	1/2	28	4	28	3	28	4	35	4	20	3	7	1/2
6	Public Bank Berhad	F	31	5	24	3	36	4	55	5	12	2	185	22	203	24
7	Southern Bank Berhad	F	-	-	-	-	-	-	10	2	15	2	17	2	21	2.5
8	Tenaga Nasional Berhad	TS	29	3	33	3	35	4	52	5	83	6	134	15	94	7
9	Telekom Malaysia Berhad	TS	32	2	54	3	155	11	156	15	162	10	234	19	198	17
10	EON Berhad	TS	10	2	12	2	37	2	34	3	30	3	67	6	157	12
11	Star Publications Berhad	TS	56	9	73	10	95	12	68	8	83	7	126	12	148	19
12	KFC Holdings Berhad	TS	27	3	35	4	30	4	19	2	43	4	113	4.5	13	1.5
13	Dialog Group Berhad	TS	24	4	26	5	22	5	8	2	10	2	10	2	10	2
14	Shell Refining Co Bhd	IP	21	2.5	111	7	10	2	130	11	130	8	134	10	142	12
15	Gold Hope Plantation Bhd	PL	89	10	194	20	180	16	288	23	264	20	276	21	281	21
16	Highland & Lowland Bhd	PL	32	3	51	5	67	5	128	8	128	9	131	11	142	13
17	United Plantations Berhad	PL	20	2	26	3	28	5	40	7	49	6	52	6	61	7
18	Kulim (Malaysia) Berhad	PL	-	-	-	-	-	-	27	2	57	5	45	4	43	4
19	SP Setia Berhad	PR	14	1	15	1	12	1	14	2	38	3	32	3	35	3
20	Gamuda Berhad	CN	19	2	21	2	17	1	14	2	11	1	15	2	21	3
21	IJM Corporation Berhad	CN	8	1.5	10	2	122	11	167	11	150	11	144	11	154	12
22	Road Builder (M) Berhad	CN	9	1	10	2	27	3	46	8	83	14	86	14	98	15

Notes: *1= Number of pages, 2= Number of sentences, CP=Consumer Product, F=Finance, TS=Trading and Services, IP=Industrial Product, PL=Plantations, PR=Properties, CN=Construction.*

Table 3. Descriptive Statistics of Corporate Social Responsibility Disclosure (CSRD)

	CSRD dimensions				**CSRD**
Items	Employee	Community	Product	Environment	Overall
Mean	0.7034	0.2448	0.3288	0.1894	1.4663
Std. Error of Mean	0.0154	0.0186	0.0226	0.0202	0.0586
Median	0.6667	0.0000	0.0000	0.0000	0.8300
Std. Deviation	0.4352	0.5266	0.6391	0.5715	1.6564
Variance	0.1894	0.2773	0.4084	0.3266	2.7438
Skewness	1.2425	2.2643	3.2117	3.8219	2.2552
Kurtosis	2.4361	4.4652	22.4010	15.8633	5.7336
Range	2.5000	2.8333	7.6667	4.0000	11.4133
Minimum	0.1667	0.0000	0.0000	0.0000	0.1667
Maximum	2.6667	2.8333	7.6667	4.0000	11.5800

Table 4. Descriptive Statistics of Corporate Social Responsibility Disclosure (CSRD)

Based on Industry group

Industry groups	Minimum	Maximum	Mean	Variance	Skewness	Kurtosis	N
Consumer Product	0.17	7.17	1.8739	3.6992	1.3171	0.5072	182
Finance	0.17	7.83	1.5462	2.5265	2.1188	4.2436	175
Trading & Services	0.17	9.25	1.5785	2.5462	1.8065	3.7793	294
Industrial Product	0.17	7.75	1.2001	1.5664	2.2810	6.8229	259
Plantation	0.17	11.58	2.0872	6.9794	1.7152	2.2013	133
Properties	0.17	9	0.9605	1.0398	4.3057	29.0521	224
Construction	0.17	7.33	1.8385	3.0631	1.5174	1.9110	77
Technology	0.17	2.5	0.8415	0.4044	1.6223	2.3361	35
Hotel	0.17	0.33	0.2900	0.0052	-1.3266	-0.3259	21
Overall sample	0.17	11.58	1.4662	2.7441	2.2552	5.7329	1400

Three Problems in Co-governance Mechanism

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Abstract

The co-governance mechanism based on the stakeholder theory is suspected because of "three problems" from mainstream economists. In this article, we adopt many methods such as literature induction and mathematical demonstration to solve three problems in the co-governance mode and offer theoretical proofs for multiple benefit bodies participating co-governance.

Keywords: Co-governance, Stakeholder, Three problems

1. Base of co-governance and the theory of stakeholder

Since the middle of 1980s, the stock structure of English and US enterprise has extremely dispersed, and the governance mode of "stockholder first" has been suspected extensively because many problems such as the protection of middle and small sized stockholder benefit and anti-annexing, and the problems of interior personnel control and agent costs are more and more serious. After that, the theory of stakeholder occurred, so these theories compose the base of co-governance mode.

The theory of stakeholder roots in incomplete contract theory and modern property right theory. The contract theory thinks that enterprise is a group of connection point and agent relationship of contract, ad every contract participator provides individual resource to the company, and so every one should enjoy the right of equal negotiation (Chen, 1996, p.103-107). At the same time, enterprise is team production in fact, and its essential is the mutual dependence between human resource and non-human resource. To protect the dependence resource to avoid loss, team members should make long-term contract to ensure an anticipated compensation, which offers base for stakeholders' co-governance. However, Hart pointed out that contract was incomplete because the existences such as trading charge, opportunism behavior, human limited sense and information asymmetry. So the property right can be divided into special rights and residual rights. The residual right is the property right which is not definitely confirmed because of the incompleteness of contract, and it is a sort of "state-contingent ownership", i.e. different persons possess residual claim rights and residual control rights under different status (Zhang, 1999, p.52-53). And professor Zhang, Weiying utilized mathematical model to prove it.

According to the theory of contract, all participators of enterprise contract should enjoy the allocation right of enterprise residual rights. However, how to exactly confirm stakeholder of enterprise and avoid the problems of enterprise object diversification and governance efficiency becomes into the focus that mainstream economists suspect the co-governance mode.

2. Problem of "confirmation of stakeholder"

The most important reason that mainstream economists criticize the co-governance mode is that it can not confirm enterprise stakeholder. Because the boundary of basic concept is not clear, so the theory of stakeholder can not confirm a specific research object. In fact, according to 27 sorts of representative definition, we found that most scholars tended to confirm the stakeholder from combination association and investment specialization, and they thought stakeholders mean some persons who implemented certain special investment in enterprise, and these persons were associated with enterprise and the association degree was decided by the size of investment specialization.

Therefore, the confirmation of stakeholder is decided by three factors. First, stakeholders must implement special investment to the enterprise. Second, stakeholders assume certain management risk of the enterprise. Generally speaking, the size of risk is closely related with stakeholders' investment specialization degree in the enterprise. Third, according to Freeman's classic definition, stakeholders must be related with the activities of enterprise, and this sort of relationship may be active or passive.

However, the confirmation of stakeholder doesn't mean that the stakeholders' characters are grasped. We still need to

utilize some dimensions to classify numerous stakeholders. In 1997, Mitchell studied the production and development history of stakeholder theory, and put forward the grading method to confirm stakeholders. Mitchell put forward three characters including validity, right and emergency and graded stakeholders, and he divided stakeholders into three sorts, i.e. (1) confirmed stakeholders, they possess validity, right and emergency for corporate problems simultaneously such as stockholder, employee, creditor and employee, (2) anticipated stakeholders, they keep close association with enterprise and possess two items of above three characters, (3) potential stakeholders, they only possess one item of above three characters (Yang, 1998, p.38-45).

In theory, all owners who fulfill three key factors should participate in corporate governance. However, the actual organizational trading costs are not ignored. The confirmation of reasonable dimensions should follow the balance principle of main principle dimension, and adopt marginal analysis decision method, i.e. when the income brought by the increase of factor is equal with added organizational cost, to decide the optimal dimension of effective governance structure.

Suppose there are m sorts of factor main bodies in enterprise, and obviously, investor is one necessary main body in enterprise contract, i.e. n=1. However, though stockholders have higher individual incomes, but it will induce the decrease of corporate net income. When the quantity of governance main body is n, the corresponding corporate net income is

$$s_n = \int_0^n (f_1(n) - f_2(n))\, dn, \text{ and } s_1 - s_n < 0 \quad (n > 1)$$

Where, $f_1(n)$ is the benefit of governance, $f_2(n)$ is the organizational cost. When $n \to +\infty$, the cost charge will increase and the income continually decreases, so the net income of enterprise may be negative. That is to say, there is a critical value n_1 in n to make $s_n' > 0$ when $n < n_1$. Professor Lu, Changcong obtained similar conclusion by the social cost analysis method.

So the right main body should be kept in the status of n_1 in the governance structure. According to the Mitchell grading method and combining with the actual situation of china enterprise governance structure, in this article, we think the optimal dimensions of governance main body should be four to six, and include multiple benefit main bodies such as stockholder, creditor, manager and employee.

3. Problem of "object diversification"

In the governance mode of "stockholder first", the corporate object is represented as the value maximization of stockholder. So the corporate object of co-governance is to pursue the stakeholders' benefit maximization, and corporate manager should not only consider stockholders' investment return, but also care for the benefits of stakeholders such as employee and creditor. But the benefit relationships among stakeholders are very complex and contrary, and they can not be quantified exactly, so in practice, they can not be realized and will induce interior manager control. and as one subsystem and the realized base of corporate value, the financial object is to allocate corporate resource and ensure the increase of corporate value. When corporate value can not be quantified, the financial object of enterprise should be the fist selection of the value maximization of enterprise (Du, 2005, p.7-8). Only the financial object of enterprise is ensured, others' benefits can be realized, i.e. efficiency first and then justice.

In this article, we thought the reason of object problem is the confusion of corporate object and financial object. The corporate object of co-governance is to pursue the stakeholders' benefit maximization, and as one subsystem and the realized base of corporate value, the financial object is to allocate corporate resource and ensure the increase of corporate value. When corporate value can not be quantified, the financial object of enterprise should be the fist selection of the value maximization of enterprise (Du, 2005, p.7-8). Only the financial object of enterprise is ensured, others' benefits can be realized, i.e. efficiency first and then justice.

Though we have confirmed the financial value guidance of co-governance enterprise object, if we have not a specific representative financial index, we will get in the tautology with another form (Zhang, 2002, p.109-112). When enterprise uses all stakeholders' resources to create mutual financial values, all costs relative to resource are individual value factors irrespective with mutual object, and all stakeholder resource costs except for financial value (profit of resource cost) are mutual value objects, which also represents all stakeholders' mutual cake.

From another angle, when putting enterprise on the supply value chain of the whole market, the difference between values obtained from the lower customers and values paid to the upper suppliers is the value distributed in the market value chain, which is called as total value added (TVA), and it belongs to same value connotation denoted from different angles with the "resource cost profit" obtained in the interior value of enterprise, and both of them are financial indexes to represent stakeholders' mutual benefits. Different with the unit value which pursues income maximization of every share in the stockholder value maximization theory, TVA in the logic of stakeholder can not be unified, because different natures of stakeholder resource have not the mutual share base "n" which can be compared (Li, 2003, p.20-21).

So we think TVA can represent all stakeholders' mutual financial value object and explain the concrete connotation of financial value maximization for enterprises.

According to Zhang, Wuchang's theory, TVA not only extends the range of corporate financial object to all stakeholders, which has more universality and applicability than stockholder value, but also confirms object orientation, which possesses more particularity and maneuverability than corporate value maximization, and it is the development and abstract of object theory between stockholder value maximization and tautology (Zhang, 1999, p.52-53).

Furthermore, TVA pitches stakeholders' mutual financial value, eliminates other non-financial value inducing interior conflict, makes the financial object has specific orientation, doesn't consider complex and diversiform individual factor, and only pitches the object in a total factor and makes it keep its exclusion nature (Zsuzsanna, 1996, p.277-296).

4. Problem of "co-governance efficiency"

Relative to the logic of "stockholder first", the theory of stakeholder is more justice and easy to attract resource for enterprises because multiple main bodies' mutual possession enjoins more benefits than individual stockholder. However, discommenders pointed out the co-governance sacrificed the production efficiency of team, dispersed control rights and induced efficiency loss and decision deadlock.

In this article, we think the multiple stakeholders in co-governance could enhance and improve the efficiency of united decision. First analyze the implementation condition that united decision enhances the efficiency, i.e. under what situation, the united decision could exceed individual decision. Suppose the precise rate of every individual decision is $p\,(0 \leqslant p \leqslant 1)$, so the probability of failure is $q = 1 - p$. If many people make collective decision, and form collection decision according to the principle of simple majority. Here, we only take three persons decision as the example (the conclusion can be extended to any multi-main bodies).

Proposition 1. If only everyone's decision precise rate exceeds 0.5, the effect of united decision will exceed individual decision.

Suppose every decision-maker has equal level and independent decision status, and we don't consider the cost of organization (suppose the income of united decision exceeds the cost of trading). Under the situation of three-person united decision, the probability of precise united decision is $p^3 + 3p^2q$, and the probability of mistake is $p^2 + 3p^2q$.

So if we want to enhance the precise rare of united decision, we should fulfill the condition, $\dfrac{p^3 + 3p^2q}{3pq^2 + q^3} > \dfrac{p}{q}$. So we can obtain $p > 0.5$.

If the probability that every decision-maker makes precise decision respectively are p_1, p_2 and p_3, and take $p = \min\{p_1, p_2, p_3\}$, we can obtain similar conclusion.

Proposition 2. Members' decision-making level in the united decision layer can be continually enhanced, and the whole level of united decision can be gradually enhanced.

Suppose the probability of individual precise decision in the first time decision-making behavior is p_1, the probability of individual precise decision in the second time decision-making behavior is p_2, and every decision-maker's study curve could fulfill $p_2 \geq p_1$, and suppose $f(p) = \dfrac{p^3 + 3p^2q}{3pq^2 + q^3}$, so when $p > 0$, $f(p)$ is the monotonic increasing function.

Therefore, the sufficient and necessary condition that united decision enhances the efficiency is $p_2 \geq p_1 > 0$, i.e. if only individual precise decision-making rate is not negative, and individual continually enhance his own precise rate of decision, the efficiency of united decision would be enhanced correspondingly. On the contrary, if the efficiency of united decision wants to be enhanced continually, individual decision-makers should continually study and enhance their own decision-making abilities.

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Exercise as a Healthy Lifestyle Choice:

A Review and Avenues for Future Research

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Abstract

The health benefits of exercising and the prevalent sedentary lifestyle give a strong reason for the research into the determinants of exercise behaviour. The present paper reviews several health-related behavioural theories and models that have been applied to understand the factors influencing physical activity or exercise participation and suggest avenues for future research. In particular, a review of literature provides strong empirical support for the theory of planned behaviour, yet several theoretical issues need to be resolved to aid in the development of a more comprehensive health-related model that can explain and predict exercise behaviour. The present paper highlights that there is a need to develop and empirically test a more integrative model of exercise behaviour from consumer behaviour perspective. Besides, the conceptualisation of TPB measures and sufficiency issues related to the model need to be addressed prior to the adoption of the TPB model.

Keywords: Theory of Planned Behaviour, Consumer Healthy Lifestyle, Exercise

1. Introduction

There is a growing focus on health related issues in the media and an increasing government spending on health campaigns in Malaysia. The initiative to improve public health on the part of government has undoubtedly contributed to the increased public awareness of the importance of healthy lifestyle. Lifestyles or simply ways of living are one of the most significant factors influencing individual health and wellness (Divine and Lepisto 2005). From the marketing perspective, consumer healthy lifestyle creates new opportunities and driving innovation and at the same time presents marketing challenge to marketers in the health-related industries such as fitness clubs, food, health care, insurance, and medical. The changing consumer attitude and behaviour toward healthy lifestyle will certainly heighten their interest in healthier products and services choices. This is evident by the extensive growth of health spas and fitness clubs business that spread across urban cities in Malaysia recent years (Ramli 2005).

Bloch (1984) views healthy lifestyle as an orientation toward health prevention for the maximisation of personal wellness. While healthy lifestyle encompasses a wide variety of behaviours, most healthy lifestyle research has focused on diet and exercise (Divine and Lepisto 2005). Kraft and Goodell (1993) notice that consumer shift in exercise and dietary behaviours have been the most visible lifestyle change. From a marketing perspective, exercise is associated with an orientation toward consumption as they are a set of activities, interests, and opinions that are related to the consumption of various health-related products and services (Kraft and Goodell 1993). Exercise is regarded as a recognised component of healthy lifestyles and desired public health behaviour (Bungum and Morrow 2000). The discussion of the present paper focuses on exercise as one of the components of healthy lifestyle behaviour.

Regular physical activity and fitness contribute to overall health and fitness (Ooyub and Omar 2002). It is widely known that regular exercise is associated with a significant decline in the risk of cardiovascular complications, high

blood pressure, obesity and weight management, and mortality rates. Regular exercise also helps in the reduction of symptom of depression and anxiety (Blair 1993). Despite the facts that these positive physical and psychological benefits of exercise are well documented and well publicised, levels of physical inactivity are increasing worldwide (Bond and Batey 2005). Due to the various health and social problems associated with sedentary lifestyle, research into investigating determinants affecting exercise behaviour is warrant. Analysing exercise behaviour can lead to a better understanding of how these related factors interact and influence each other, thus building a deeper understanding of complex consumer behaviour.

A thorough understanding of what drives Malaysian adopting healthy lifestyle is paramount. However, little research related to exercise and fitness has been found in the marketing literature. Very few studies have examined exercise behaviour in Malaysia. Most of these studies are commercial like survey or academic research that covers incomprehensive analysis of the predictors of exercise behaviour. Health-related marketing is not as simple as classifying consumers into "healthy" or "unhealthy" groups. A complex balance of appropriate factors should be taken into account in developing a solid theoretical model to examine the underlying factors determining health-related lifestyle behaviour.

The present paper reviews several health-related behavioural theories and models that have been applied to understand the factors influencing physical activity or exercise behaviour participation. Several key research issues will be identified to aid in the development of a more comprehensive health-related model that can explain and predict a specific desired health behaviour, exercise. Such model could be useful to health care marketers in segmenting markets, targeting promotions and positioning products and services. Armed with this knowledge, marketing practitioners can then find potential market opportunities and to determine the appropriate marketing mix in order to develop practical and effective marketing strategies.

2. Healthy Lifestyle and Marketing

The impact of healthy lifestyle behaviour on both consumer and society has been an issue and concern of both marketers in the health-related industries and public policy makers for long. Healthy lifestyle promotion is associated with consistent health conscious behaviour like quitting unhealthy behaviours such as smoking, alcohol consumption, or sedentary behaviours; and practicing healthy behaviours like regular exercise, healthy dietary practices, weight control, and managing stress (Nahas, Goldfine and Collins 2003). Overall, healthy lifestyle behaviours are activities undertaken to protect, promote or maintain health (Steptoe, Wardle, Vinck, Tuomisto, Holte and Wichstrøm 1994) as well as an orientation toward health prevention for the maximisation of personal wellness (Bloch 1984).

The spread of contagious diseases as well as the rising statistics of illnesses such as diabetes, heart attack, and cancers have heightened the importance of maintaining healthy lifestyle. Malaysians are increasingly conscious of the food and supplements they eat, the quality of drinking water and air as well as the general state of health, especially among population of middle to higher social-economic class group. Many health experts and nutritionists have generally reached consensus that that consumers can reduce the risk of illnesses such as heart disease, stroke, and cancer by monitoring their diets and by maintaining a healthy lifestyle including regular exercise (Rimal 2002). Therefore, promotion of health lifestyle or health seeking behaviour is an effective way to reduce or even to avoid the medical costs of treating such preventable illnesses associated with lifestyle behaviours (Murrow and Welch 1997).

Healthy lifestyle encompasses variety of behaviours such as healthy diet, tobacco-free lifestyle, regular exercise, substance use, cautious preventive practices, weight control and supportive environment (Omar 2002). Most researchers work on healthy lifestyle behaviours have focused their research on diet and exercise (Divine and Lepisto 2005). In addition, exercise and dietary behaviours have been recognised as the most visible lifestyle shift among consumers (Kraft and Goodell 1993). Generally, people rely on regular exercise as a means to maintain both their physical health and psychological well-being (Plante and Rodin 1990). There are increasing concerns about health and fitness among Malaysian especially among urbanite and higher social class groups. Health conscious consumers adopt varying strategies at different intervention levels in an attempt to adjust their lifestyle behaviours. These strategies include healthy diet, regular exercise as well as efforts in balancing work stress. Some consumers go beyond these basic steps to seek fast results such as consuming health supplements, slimming and low calorie diet, and the purchases of exercise equipment.

All these trends have strong implications to both marketers and policy makers. The increased public awareness of health lifestyles has resulted in great business opportunities for many marketers and lead to a wide range of new consumer products and services. For instance, in the food industry, numerous low-fat, low cholesterol, low-sugar, and low-preservative foods have come on the market and have been widely promoted. It is also evident that medical services such as homeopathic treatment based on herbs, acupuncture and traditional massage are becoming popular in Malaysia. The health club and various fitness programs have spread across urban areas in the country. Several fitness trends such as the embracement of home exercise equipment; diversified forms of exercise and fitness club popularity are evident among urbanite, more affluent and educated population (Ramli 2005).

Marketers in the health industry also face considerable marketing challenges partly due to consumers' unhealthy habits and preference to sedentary lifestyle which are evident in the media reports of obesity, smoking, lack of exercise (Mohd Shariff and Khor 2005), and poor eating habits among Malaysian (Mohamad 2000). The shifts in consumer buying patterns have greatly altered the way many marketers in the food, healthcare and medical services industry market their brands. Marketers start to embrace innovative marketing strategies and findings ways to differentiate themselves in the competitive market. Those in the advertising business are also aware of the changes and making much adjustment to make their advertisement more appealing to consumers. A comprehensive model in understanding and explaining health behaviour will definitely contribute to the design of effective marketing strategies and programs.

3. A Review of Health Behavioural Models

Several health-related behavioural theories and models have been applied to understand the factors influencing physical activity or exercise behaviour participation. Biddle and Nigg (2000) organise these theories and models into the following four categories: 1) belief-attitude theories (i.e., health belief model, protection motivation theory, theory of reasoned action TRA and planned behaviour); 2) competence-based theories (i.e., self-efficacy theory); 3) control-based theories (i.e., locus of control, self-determination theory); and 4) decision-making theories (i.e., transtheoretical model of stages of change). A brief review of these models will be provided in this section.

3.1 Health Belief Model (HBM)

The HBM model originated in the 1950's based on the work of Rosenstock was developed to explain why people did or did not engage in certain health behaviours, such as drinking, self-screening, smoking, and dietary behaviours. This model contends that the decision to adopt the health behaviour depend on their perceived benefits and barriers related to the implementation of the behaviour change (Rosenstock, Stretcher and Becker 1988). Within the theoretical context of the HBM model, perceived barriers are directly related to perceived severity and susceptibility, while perceived benefits are the perceptions that certain behaviour change will be effective in reducing a barrier (Wood 2008). The HBM assumes that a person will adopt certain health behaviours if they feel the consequences are severe and feel susceptible to that illness (Rosenstock, Stretcher and Becker 1988) (see Figure1).

The HBM model has been applied in the health promotion and lifestyle behaviour studies. For instance, Jayanti and Burns (1998) develop and test a model of preventive health care behaviour basing on the HBM model. Grubbs and Carter (2002) also modify the HBM framework in an attempt to examine current exercise habits and perceived benefits and barriers to exercise. However, the HBM model has proven to be more valuable in understanding why people cease certain unhealthy behaviour (e.g., smoking or drugs taking) rather than the adoption of healthy behaviour (e.g., exercise, healthy eating) (Nahas, Goldfine and Collins 2003). In an extensive review on exercise behaviour, Biddle and Nigg (2000) conclude that the application of HBM model to exercise or physical activity has yielded little success in predicting the adoption or maintenance of exercise participation. In agreement with this, Wood (2008) states that the HBM has limited application in examining motivation to exercise participation. However, Wood (2008) observes that the addition of self-efficacy construct into the model has improved its applicability in exercise domain.

3.2 Theory of Reasoned Action (TRA) and Planned Behaviour (TPB)

The TPB is an extension of the TRA (Fishbein and Ajzen 1975). The TPB extended the TRA by adding the perceived behavioural control (PBC) because the TRA has difficulty in explaining behaviours in which a person does not have volitional control over it. The TPB model (see Figure 2) posits that intention to perform a given behaviour is the immediate antecedent of that behaviour (Ajzen 1991). Behavioural intention refers to the amount of effort a person exerts to engage in behaviour. It captures the motivation factors necessary to perform a particular behaviour (Courneya, Bobick and Schinke 1999). That is, the more a person intends to carry out the intended behaviour, the more likely he or she would do so (Armitage and Conner 1999a). Intention is determined by three conceptually independent variables labelled attitude, subjective norms and PBC. Generally, the more favourable the attitude and subjective norm, and the greater the perceived behaviour al control, the stronger should be the individual's intention to perform a particular behaviour (Ajzen 1991).

The efficacy of the TPB model has been demonstrated empirically in many different contexts. The TPB model has also been widely applied to health-related behaviour such as food purchase behaviour, dietary supplement consumption and healthy eating behaviour. Specifically, the TPB models have proven useful in explaining and predicting exercise behaviour (e.g., Courneya, Bobick and Schinke 1999; Norman, Conner and Bell 2000; Rhodes, Blanchard and Matheson 2006). In all these studies, the researchers have introduced a modified version of the TPB model in their study and the results were different from those of the original TPB model.

3.3 Protection Motivation Theory (PMT)

The PMT, proposed by Rogers in the 1980s, is a model that has several similarities with the HBM (Biddle and Nigg 2000) (see Figure 3). This model contends that intention to engage in a particular health-related behaviour is influenced by a person's perceived severity, perceived vulnerability / probability, response efficacy, and perceived self-efficacy,

which collectively terms as threat and coping appraisal (Wood 2008). PMT has often been implemented in experimental manipulation studies (Milne, Orbell and Sheeran 2002) and has been applied successfully to several health-related behaviours, including exercise, healthy lifestyle, cancer prevention, smoking and alcohol consumption, AIDs prevention, medical treatment compliance, road safety behaviours, and environmental protection (Floyd, Prentice-Dunn, and Rogers 2000).

However, the use of PMT in an exercise context is relatively few (Biddle and Nigg 2000). Based on PMT to investigate the use of written communications to increase exercise behaviour among 170 sedentary college women, Wurtele (1983) found perceived self-efficacy to have the strongest direct effect on exercise intentions, indicating the important role of self-efficacy in examining exercise participation. This is consistent with Biddle and Nigg's (2000) extensive review on exercise behaviour that highlight the role of self-efficacy as an important construct in physical activity motivation. The strength of self-efficacy as a predictor of behavioural changes is evident as the construct was added to the HBM and PMT and the Transtheoretical Model subsequently (Biddle and Nigg 2000). Another issue to be highlighted is that although PMT has been found to predict intention to change behaviour well but the PMT is limited in explaining actual behaviour (Floyd, Prentice-Dunn, and Rogers 2000). It is possible that a person with intention to perform a particular behaviour may not actually do so eventually (Milne, Orbell and Sheeran (2002).

3.4 Self-efficacy Theory (SET)

The SET is sometimes referred to as Social Cognitive Theory (SCT) which is an extension of social learning theory (see Figure 4). The concept of self-efficacy is a major construct in the SET model proposed by Bandura (1977). Specifically in the physical activity domain, Nahas, Goldfine and Collins (2003, p. 47) define self-efficacy as the "perceptions of personal efficacy or confidence regarding one's ability to be active on a regular basis." The SET explains behaviour through two major constructs: 1) self-efficacy (i.e., the belief that one has the capabilities to perform a behaviour that will result in an expected outcome); and 2) outcome expectancies (i.e., the expected consequences of successful behaviour performance). The antecedents of self-efficacy and outcome expectancies are modelling, verbal persuasion, emotional arousal, and mastery experiences (Biddle and Nigg 2000).

The concept of self-efficacy has received great attention and has subsequently been adopted and modified by other authors as additional construct in their original model. Within the TPB framework, Ajzen (1991) argues that the PBC construct is synonymous with self-efficacy. However, several researchers (e.g., Hagger and Chatzisarantis 2005; Rhodes and Blanchard 2006; Rhodes, Blanchard and Matheson 2006) modelled the PBC construct as two separate components (i.e., perceived control and self-efficacy) and have provided evidence for a distinction between self-efficacy and perceived control. According to Biddle and Nigg (2000, p. 297), the "SET has been one of the more successful theories in the exercise behaviour field even though there are several different conceptualisation of efficacy measurement." Consistent with this statement, in an attempt to identify an appropriate theoretical framework to study exercise participation, Wood (2008) highlights that perceived self-efficacy from the social cognitive theory has been consistently shown to be the most common factor in motivating exercise participation. Future research should consider the concept of self-efficacy in examining exercise behaviour.

3.5 Locus of Control (LOC)

The concept of LOC is defined as "the extent that people perceive that reinforcements are within their own control, are controlled by others or are due to chance" (Biddle and Nigg 2000, p. 298). In the TPB model, Ajzen (2002) advocates the difference between PBC and LOC in terms of their conceptualisation. Also, while LOC is a generalised belief that remains stable across circumstances, a person's PBC may vary across situations and actions (Ajzen 1991). The use of LOC in predicting fitness and exercise behaviours has been receiving weak support (Biddle and Nigg 2000). In contrast the concept of self-efficacy and perceived control have received greater support for the prediction of fitness and exercise behaviour.

3.6 Self-determination Theory (SDT)

Deci and Ryan's (1985) Self-determination theory (SDT) contends that individual have three primary psychological needs (i.e., autonomy, competence, and relatedness) that lead them to seek and meet challenges in life. According to SDT, there are three types of motivation: 1) Amotivation (i.e., lack of intention toward a behaviour); 2) extrinsic motivation (i.e., performance of an activity to attain an outcome); and intrinsic motivation (i.e., participation in an activity for the pure enjoyment of the activity) (Wood 2008). Among these three types of motivation, intrinsic motivation is a key determinant of subsequent behaviour (Deci and Ryan 1985). This suggests that when a person enjoys and feel interested in exercise activities they are more likely to engage in exercise behaviour. The SDT is quite well known in the field of sport psychology (Biddle and Nigg 2000) and has been used as a theoretical framework to examine exercise motivation (Wood 2008). For instance, in a cross-sectional survey utilising the Self-Determination Theory (SDT), Wilson and Rodgers (2004) examine the relationship between perceived autonomy support, exercise regulations and intention to continue exercising.

3.7 Transtheoretical Model of Stages of Change (TTM)

The TTM (also called the Stages of Change) was originally proposed by Prochaska and DiClemente (1983) (see Figure 5). This model posits that individual tends to change health-related behaviours, such as smoking, exercise, healthy diet eating, by moving through stages of behavioural change that reflect their readiness to change. The five behavioural stages are precontemplation, contemplation, preparation, action, and maintenance (Prochaska, Diclemente, and Norcross 1992). The Transtheoretical model has been applied to a wide variety of health-related behaviours such as smoking cessation, dietary fat reduction, and exercise behaviours (O'Hea, Wood and Brantley 2003). For instance, Cardinal, Tuominen and Rintala (2004) assess American and Finnish college students' exercise behaviours on the basis of TTM and the results generally support the use of TTM in understanding exercise behaviour among college student population. In the exercise domain, the use of TTM was initiated with measurement development followed by scale validation. Since then, several researchers have used the TTM to develop exercise interventions (Biddle and Nigg 2000).

Although the TTM model has been popularly used to examine exercise participation, the model has attracted criticism for the lack of standardised procedure to categorise respondents into different stages of change (Povey, Conner, Sparks, James and Shepherd 1999) and its inability to adequately predict behavioural change (Armitage and Arden 2002). For example, in a study testing the ability of the TTM in predicting exercise stage transition of a random sample of Canadian adults, Plotnikoff, Hotz, Birkett and Courneya's (2001) findings demonstrate only partial support for the internal validation of TTM in the exercise domain.

In comparing TPB with TTM, Courneya and Bobick (2000) argue that the TPB may be a more comprehensive and sophisticated model for explaining health-related behavioural change despite the facts that both models share many conceptual similarities. It is also worth highlighting that the concept of self-efficacy has been successfully incorporated into the TTM (Biddle and Nigg 2000). In an attempt to examine adolescent's exercise behaviour using the TTM, Nigg and Courneya (1998) found that self-efficacy tend to increase across the stages of exercise behaviour change. These findings again indicate the importance of self-efficacy construct in the exercise behaviour study.

4. Determinant of Exercise Behaviour

Determinants refer to those factors that potentially influence behaviour in question. Nahas, Goldfine and Collins (2003) classify determinants of exercise behaviour into two categories: 1) facilitators (refers to determinants that promote exercise participation); and 2) barriers (refers to determinants that discourage or restrain participation in exercise activities). In another study, Furlong (1994) divides the factors that influence exercise behaviour into two major categories, i.e., environmental and personal characteristics. In his study, Furlong (1994) views environmental characteristics as physical and social environmental factors that are associated with exercise and physical activity, which include spouse and family support, perceived available time, access to facilities, peer influence, cost, climate, etc. Whereas, personal characteristics are defined as past or present knowledge, attitudes, behaviours, personality characteristics, biomedical traits, and demographic factors that may influence exercise behaviour.

Over the years, much research has been conducted to examine which variables determine exercise behaviour. Whether an individual participates in exercise behaviour depends on a variety of factors. For instance, Kerner and Grossman (2001) state that these factors may include past program participation, high risk for coronary heart disease, perceived health, level of education, self-motivation, self-efficacy, behavioural skills support by a significant other, perceived available time, access to facilities, family influences, peer influences, cost and attitude toward physical activity. Nahas, Goldfine and Collins (2003) view the performance of exercise behaviour as a complex process, which may be affected by various intrapersonal, interpersonal, and environmental factors such as demographic and biological factors; psychological, cognitive, and emotional factors; behavioural attributes and skills; social and cultural factors; physical environment factors; and physical activity characteristics. It was observed that some of these determinants or factors have been captured in a number of health-related theories and models discussed aforementioned in the previous section.

It is now evident that behavioural change isn't a simple process. To summarise the above factors that influence exercise behaviour, one may group them into several major categories as: (1) attitude toward exercise; (2) social or normative influence; (3) perception of control; (4) self-efficacy; (5) motivation (6) demographic factors; (7) personality characteristics. It is known that the TPB model contains social cognitive constructs such as attitude, subjective norm and PBC as well as intention (which captures motivational factor). Whereas the demographic and personality factors are background data postulated in the TPB (Ajzen and Fishbein 1980; Ajzen 1991). Hence, it seems that the TPB would be a comprehensive and useful framework for examining exercise behaviour.

5. A Comparison between TRA and TPB

Other than the aforementioned theoretical models adopted in examining exercise behaviour, there are also non-theoretical based studies in the domain. These studies employed no theory and often used demographic variables and rely on more intuitive predictors in examining exercise behaviour. For example, Bungum and Morrow (2000)

examine the differences in self-reported rationale for increased physical activity by ethnicity and gender among randomly selected American household. Another example is Trujillo, Brougham and Walsh's (2004) study in examining age differences and the levels of concern for various types of exercise consequences. Nonetheless, the understanding and promotion of health-related exercise and physical activity needs to be based on appropriate theory (Biddle and Nigg 2000). Despite the number of social psychology theories available, there is no general consensus exists regarding which is the best theoretical framework for the studying exercise behaviour (Wood 2008). However, a review of literature revealed that the TPB has been successfully applied to exercise behaviour.

In terms of predictability, there are sufficient empirical evidence indicates that the addition of PBC to the original TRA model has yielded significant improvements in the prediction of intention and behaviour (Ajzen 1991). In comparing the predictability of TRA and TPB model, several meta-analyses have provided support that the TPB is a useful model for predicting behavioural intentions and behaviour in variety of context. For instance, a review of 16 studies using TPB by Ajzen (1991) revealed a considerable amount of explained variance in intentions can be accounted for by attitude, subjective norm, and PBC; with an average correlation of .71. For health behavioural studies, Godin and Kok's (1996) meta-analyses found that PBC contributed a mean additional variance of 13% to the prediction of intentions and 12% to the prediction of behaviour.

Specifically, Hausenblas, Carron and Mack (1997) report a meta-analysis on applications of the TRA and TPB to exercise behaviour and conclude that the TPB is more useful than the TRA in the exercise domain. Further, the efficacy of TPB also holds in experiment setting. Notably, the consistent findings across four different health behaviours in two experimental studies conducted by McCaul, Sandgren, O'Neill and Hinsz (1993) clearly support the predictive ability of the TPB for the performance of health behaviour. Yet in another study longitudinal study, Armitage and Conner's (1999b) study on food choice behaviour demonstrated that TPB constructs are stable predictors across time points.

Theoretically, the TPB model is more appropriate and comprehensive in predicting exercise behaviour compared to the TRA. This is because whether to exercise or not is not entirely under a person's volitional control. There are some control factors that may affect individual's exercise participation such as physical inability, time and money constraint, neighbourhood security, availability of exercise equipments and so on. Hence, it is deemed to be necessary to examine beyond the attitude and subjective norm construct in the TRA but to explore further the control factor that possibly influence individual's exercise participation.

6. Rationale for the Adoption of TPB Framework

As discussed, there exist many other social psychology models in health-related studies. The TPB model represents the most appropriate theoretical framework for the study of exercise behaviour due to a number a reasons. Firstly, many researchers agreed that TPB represents the most compelling and well-established model for the prediction of intentional behaviour (Biddle and Nigg, 2000; Courneya and Bobick 2000; Armitage and Christian 2003; Rivis and Sheeran 2003). For instance, in their meta-analysis, Rivis and Sheeran (2003) advocate that the TPB is the most influential theory for the prediction of social and health behaviour. More specifically, in the exercise domain, Rhodes, Jones and Courneya (2002) point out that the TPB is the most validated and prominent social cognitive theories for understanding and explaining exercise behaviour.

Second, one of the main indicators of the validity of a theory is that it needs to be demonstrated that the particular theory works under a variety of context (Bamberg, Ajzen and Schmidt 2003). Sheppard, Hartwick and Warshaw (1988, p.338) conclude in a meta-analyses that "the TPB model has strong predictive utility, even when utilised to investigate situations and activities that do not fall within the boundary conditions originally specified for the model". In line with Sheppard, Hartwick and Warshaw's (1988) argument, it is evident that this theory has received good empirical support in predicting a wide range of behaviours (For meta-analyses, see Sheppard, Hartwick and Warshaw 1988; Godin and Kok 1996; Armitage and Conner 2001). Its strength in terms of broad applicability also found spanning the areas of social psychology, sports science, nursing, health medicine, information technology, etc (Notani 1998; Armitage and Conner 1999b). For instance, Godin and Kok's (1996) review of the Ajzen's TPB in the health domain indicated that the theory performs very well for the explanation of both intention (with averaged R^2 of .41) and behaviour (with averaged R^2 of .34). Further, in their meta-analysis reviews of the TPB and exercise literature, Hausenblas, Carron, and Mack (1997) and Hagger and Chatzisarantis (2005) support the utility of the TPB for understanding and predicting exercise behaviour.

Third, the TPB is a parsimonious model (Abraham and Sheeran 2003) and hence relatively small number of variables is sufficient to ensure accurate prediction of behaviour. This theory is deemed appropriate as it covers major factors that are important in the present study such as attitude, normative influences, perception of control over exercising, and behavioural intention. Next, a theoretical model that can explain multidimensional determinants of exercise behaviour is needed. In this instance, the TPB allows the investigation of personal, social and psychological influence on individual exercise behaviour more comprehensively (Godin and Kok 1996; Hausenblaus, Carron and Mack 1997). Many theories and models have been used to examine the multidimensional (e.g., cognitive, social, behavioural) factors that affect

individual exercise behaviour over the years (Symons Downs and Hausenblas 2003). While all of these models have shown some utility in understanding exercise behaviour, Biddle and Nigg (2000) claim that the TPB is still the most comprehensive and validated theories used in examining exercise behaviour.

Fourth, the TPB provides a systematic guidelines and clearly defined structure/framework that could guide researchers on how to measure social cognitive constructs specified by the model in achieving greater predictive accuracy (Ajzen and Fishbein 1980). For example, Ajzen (1991) highlights the importance of adhering to the boundary condition of correspondence within the TPB to ensure that measures of TPB construct are compatible (i.e., all refer to the same action, target, context, and time). The guidelines on TPB questionnaire construction as well as sample questionnaires are easily accessible online. Lastly, the model is useful for the explanation and prediction of consumer behaviour utilising behavioural intentions as a mediator (Ryan and Bonfield 1975).

Indeed, there is no general consensus among researchers exists regarding which is the best theoretical framework for the studying exercise behaviour (Wood 2008). Since the TPB contains social cognitive factors that are common to most of the other behavioural theories and models, it is deemed to be a promising framework basis from which a more integrative model of exercise behaviour may be developed. Abraham and Sheeran (2003, p. 265) state that "as a model of the cognitive antecedents of behaviour, the TPB is parsimonious, empirically supported and can be operationalised easily, according to available guidelines". This quotation summarised the above rationales for using the TPB as a framework base for the examining behavioural studies.

7. Conclusion

The Health Ministry has been putting much effort in health promotion by educating the public about the importance of health. However, despite the fact that Malaysian general public is aware of the benefits of exercising and the potential risks of physical inactivity especially among those in middle and higher socio-economic status, there is still low participate rate in exercise activities. The government is concerned with the health issues that will affect the productivity and consequently, the nation economy in view of the importance of health as an asset in the development of human capital. However, the fact is that health awareness and knowledge have little influence on individual exercise participation despite various health promotion campaign organised by the government agencies. In fact, an empirical study conducted by Jayanti and Burns (1998) demonstrates that health knowledge has no significant effect on preventive health care behaviour. There might possibly be other social and/or psychology factors that influence individual exercise participation. With regards to the application of TPB model, several issues were observed from a review the past exercise research applying the TPB. These research issues need to be addressed in future research and it includes:

1.   The sufficiency of the TPB model has been questioned despite numerous empirical supports for the use of the model. Most of the researchers approached the sufficiency issues by including additional constructs in the original TPB model and tend to demonstrate improvement of predictive ability of their model (Armitage and Conner 2001; Hagger, Anderson, Kyriakaki and Darkings 2007). However, Ajzen (2001) commented that most part of the improvement in predictive ability were relatively small and hence the results are not generalisable to other behavioural domains despite the fact that significant improvements were found in these studies.

2.   Also, relating the issue of sufficiency, most of the TPB researchers often rely on more intuitively and arbitrarily derived predictors (Bakker, Van Der Zee, Lewig and Dollard 2006) as the additional variables in their framework. Very few researchers have looked into a more comprehensive and integrative model which enable the examination of predictors that influence exercise behaviour simultaneously. There is a need to develop an integrative model in order to provide more comprehensive and coherent view points in the study of exercise behaviour.

3.   Exercise research has received great attention in the literature from various disciplines such as health science, medicine, health and social psychology. Most of these exercise behaviour related studies were conducted in the West; there have been very few studies examining the psychosocial predictors of exercise behaviour from consumer behaviour and/or marketing perspective.

4.   It is generally agreed that self-efficacy has been an important construct in studying exercise and / or physical activity (Wood 2008). Evidently, the concept of self-efficacy has been included into several social psychology models such as TTM, HBM, and TPB (Biddle and Nigg 2000) as additional variable in predicting health behaviour. However, Ajzen (1991) argues that the self-efficacy construct is synonymous with PBC within the TPB framework. Future research should consider the concept of self-efficacy in examining exercise behaviour. Also, the distinctions between PBC and self-efficacy should be made clear before conclusion can be drawn.

5.   The TPB predictors (i.e., attitude, subjective norm, and PBC) are traditionally measured as single concepts (Ajzen 1991). It has been a common practice to aggregate TPB components to form higher order TPB constructs (Armitage and Conner 2001; Ajzen 2002) in recent years. However, some researchers argue that this higher order structure may overlook the variation in the predictive ability of the differentiated TPB components, and hence defeat the purpose of

differentiating them in the first place (Hagger and Chatzisarantis 2005). There are also attempts to modify the original TPB model as correlated multidimensional measures and has yielded conflicting findings regarding the optimal conceptualisation of TPB constructs.

6. Biddle (1992) suggests that the study of exercise behaviour should be conducted in different settings and should also take into consideration the different types of exercise programs and physical activity. Nevertheless, it was observed that some researchers in the exercise domain have focused on narrow and specific aspects of the exercise such as aerobic, strength training, cardiovascular training, walking, running, jogging, and gymnasium. Also, while majority of the TPB studies in exercise domain have used undergraduate students as their subjects with the focus on adolescent exercise and / or physical activity behaviour, others have used specific population like clinic patient, school children and youth, obese women, and pregnant women.

7. Early studies in the exercise domain rely heavily on exploratory data analysis techniques such as regression analysis. The use of structural equation modelling (SEM) techniques in examining exercise behaviour is gaining popularity. To overcome the limitations associated with the traditional multivariate analysis (Byrne 2001), SEM technique should be used to specify, estimate and test a hypothesised model effectively (Bentler 1990).

In view of these conflicting findings and shortcomings in the literature, there is a need to address these issues with an attempt to advance knowledge on health-related behavioural studies and provide practical marketing implications for health-related products or services providers. An integrative model of exercise behaviour should be proposed and empirically tested based on the research issues identified in the present paper.

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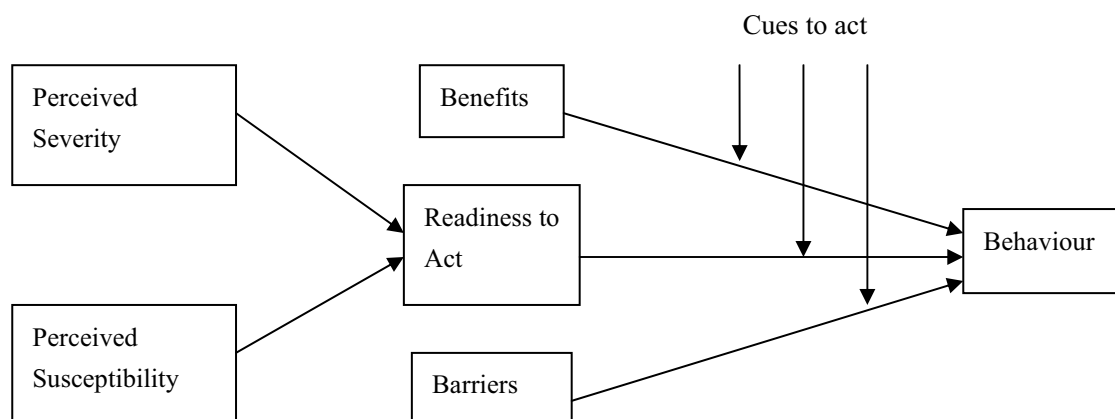
Figure 1. Health Belief Model (HBM)

Source: Adopted from Baranowski, T., Cullen, K. W., and Baranowski, J. (1999). Psychosocial Correlates of Dietary Intake: Advancing Dietary Intervention. *Annual Review of Nutrition*, 19, 17-40
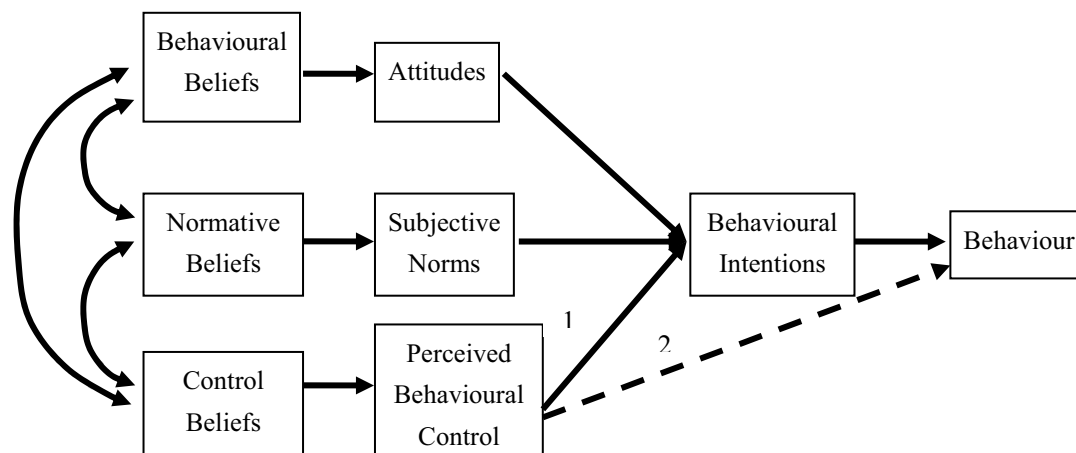
Figure 2. The Theory of Planned Behaviour. Version 1 assumes PBC has an indirect effect on behaviour. Version 2 assumes PBC has a direct effect on behaviour.

Source: Adopted from Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 50 (2), 179-212.
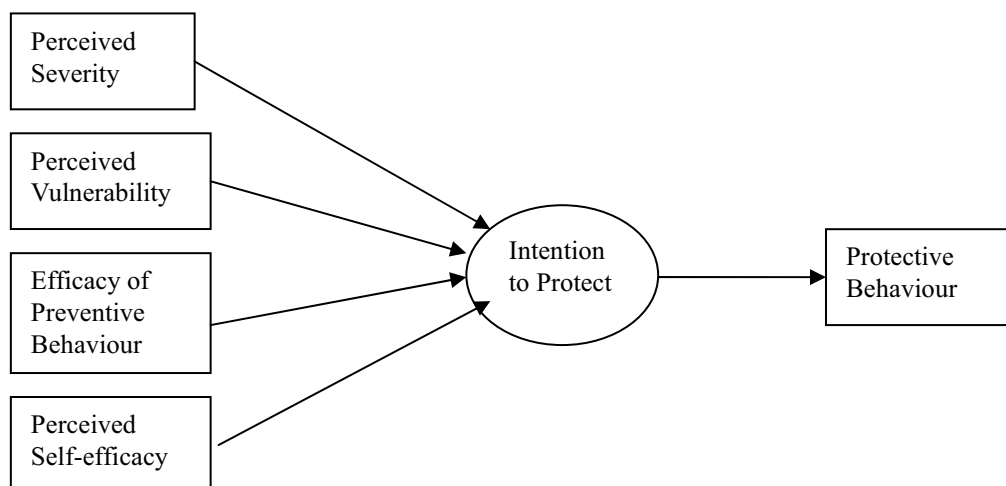
Figure 3. Protection Motivation Theory

Source: Adopted from Biddle, S. J. H., and Nigg, C. R. (2000). Theories of Exercise Behavior. International Journal of Sport Psychology, 31, 290-304
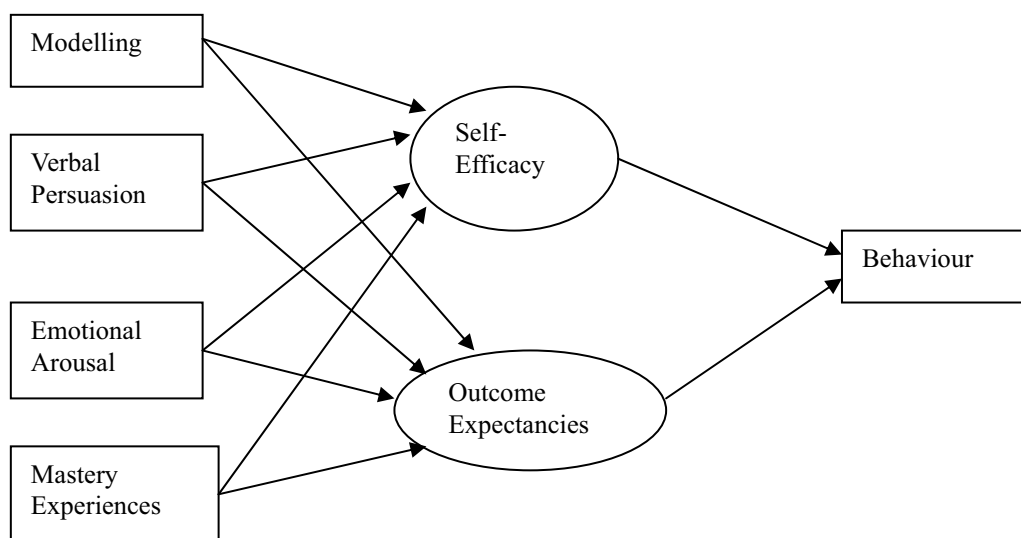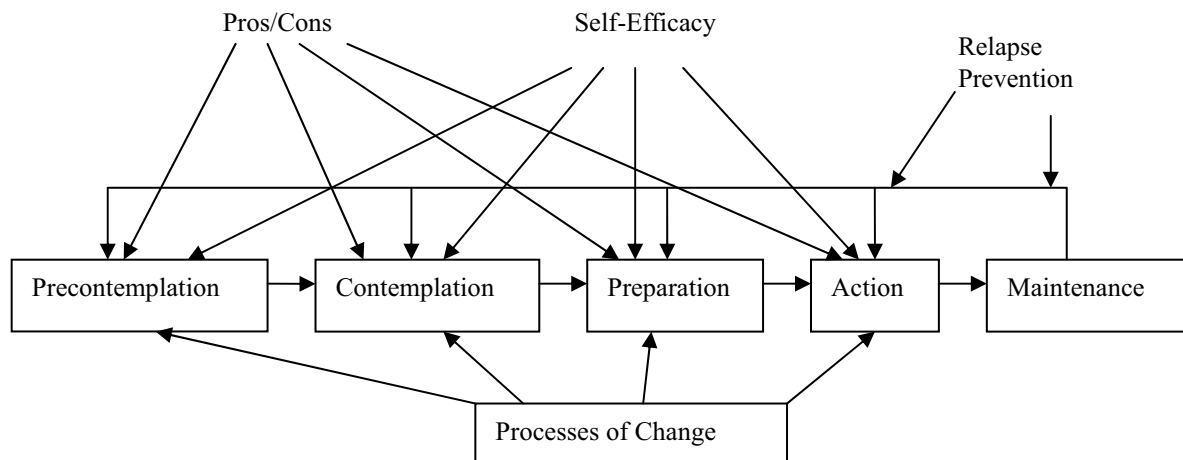

Figure 4. Self-Efficacy Theory

Source: Adopted from Biddle, S. J. H., and Nigg, C. R. (2000). Theories of Exercise Behavior. International Journal of Sport Psychology, 31, 290-304

Figure 5. Transtheoretical Model of Stages of Change (TTM)

Source: Adopted from Baranowski, T., Cullen, K. W., and Baranowski, J. (1999). Psychosocial Correlates of Dietary Intake: Advancing Dietary Intervention. *Annual Review of Nutrition*, 19, 17-40

Analysis of Main Problems and Countermeasures
about Sino-US Trade Frictions

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Abstract

China and the United States as the world's largest developing country and largest developed country, Trade relations between the two countries have been the focus of worldwide attention. This paper describes the current Sino-US trade relations, put forward the main problems of the Sino-US trade friction, and analysis the specific measures for China dealing with trade friction between China and the United States. Facing the future, the way ahead will be a lot of problems, but the base of Sino-US economic and trade development is solid. As long as both sides work together by strengthening high-level bilateral dialogue and effectively consultative mechanisms to promote mutual understanding and trust, Sino-US trade prospects are bright.

Keywords: Sino-US trade friction, U.S. trade deficit, Anti-dumping, Labor and environmental standards

1. The present situation of Sino-US trade relations

China and the United States as the world's largest developing country and largest developed country, Trade relations between the two countries has been the focus of worldwide attention. Since 1979 the diplomatic relations between the two countries had been established, Sino-US trade had been developing rapidly and comprehensively. By 2002, with China's accession to the WTO, Sino-US economic and trade relations are entering a rapid growth phase. In the past two years, the complementary nature in term of the trade structure of China and the United States continued to strengthening, Sino-US bilateral trade volume had achieved a growth rate of above 20% every year. The United States has become China's the second largest trade partner, the largest export market and the sixth largest source of imports; China has become the third largest U.S. trade partner, the second largest source of imports and the 4th largest export market. Such a high degree of dependence on trade shows that bilateral economic and trade cooperation between China and the United States has been a qualitative change, Trade content has expand from its traditionally advantageous import and export products to various areas of economic co-operation. However, the rapid development of Sino-US trade, at the same time, attendant trade friction has been growing. As a result, in theory trade cooperation between the two countries should have a wide space, however, the trade relations between the two countries are often hung over by dark clouds.

2. Main problems of Sino-US trade friction

2.1 U.S. trade deficit with China continue to be the focus of contradictions

At present, except of Hong Kong, the United States has become China's largest source of trade surplus. In theory and in practice, U.S. trade deficit will help optimize the industrial structure in the United States and help the phasing out of domestic products which had lost the comparative advantage. At the same time, inexpensive Chinese exports reduced the inflation pressure of the United States and raised the lower-middle class purchasing power in real terms. However, many economists of the United States think that the U.S. trade deficit with China is China's faults, they also believe that the Chinese government manipulate currency artificially to promote export growth. Therefore, U.S. Government has been laid constant pressure to force RMB to appreciate as a means of cutting down the U.S. trade deficit. However, facts have proven that the revaluation of RMB do not help alleviate the pressure on the dollar to weaken and reduce the U.S. trade deficit substantially. As a result, both the Chinese exchange rate system to adjust and the value of the RMB to revaluate do not have a major impact on the trade deficit with China and the United States, the problem still exists.

2.2 Anti-dumping fights between China and the United States come back

U.S. always deny the face that China have established and improved socialist marketing economic system, in the past years, U.S. always adhere discriminately to China's "non-market economy" and adopt an alternative method to calculate dumping margins. On objective, the method obliterate advantages of China's cheap labor, low wages and benefits, the interests of Chinese enterprises and products have seriously damaged. This anti-dumping "protection" means which WTO allowed put openly discriminatory policy on China's export enterprises, resulting in disadvantage of China's foreign trade in the international competition.

2.3 Pressures of labor and environmental standards sharp

Environmental protection and labor standards are the important contents of the United States trade policy in the 21st century. The main performances of environmental criteria are trade barriers which caused by environmental laws and label-certification program, commonly known as "green barriers". The main performances of labor standards embody some strict rules and standards in the production process involved in human rights, production conditions, fire prevention measures, as well as employee benefits, often referred to as "social barriers". Although these regulations and standards on the objective promote the level of environmental protection technology and production standards form exports enterprise of every country further to move closer to international standards. But in term of situation of China's relatively backward technology, the United States setting standards and the various measures accordingly no doubt is a new type of export barriers.

3. Analysis of countermeasures about Sino-US trade friction

3.1 How to reduce U.S. trade deficit with China

U.S. trade deficit with China mainly derived form the difference of the consumption structure and trade structure between the two countries, if the underlying economic structures are not adjusted, then the U.S. trade deficit with China which continued for 34 years will continue to exist. First of all, as far as people's consumption habits between the two countries, U.S. residents' consumption and investment rates are far higher than savings rates; But the Chinese people's propensity to save is very strong, which lead to little achievements of our government policy of expanding domestic demand several times. What's more, as far as the structure of export trade between the two countries, the China exports to the United States are mainly labor-intensive products and manufactured goods which are part of low-end market; The United States exports to China focused on the resources, high-tech products and services which are part of high-end market. The great differences of consumption concept and export levels between the two countries led to the obvious difference in the relative capacity of the consumer market, the strong spending power of the United States provide a broad export market for China, China imports form the United States are concentrated in energy and technology-intensive products, which are a huge amount but a substantial increase in the small space, so Sino-US trade surplus has been not to ease. To truly smooth friction and disputes the Sino-US trade surplus brought about, China must start with adjusting the industrial structure and speed up economic restructuring. China's foreign trade had spent the primary stage of growth, so we have to reduce export dependence of low-value-added manufactured goods and promote technology innovation and equipment upgrades, make "demand-driven product differentiation" instead of "the price war derived from homogeneous products" and make "higher prices for better quality" instead of "small profits but quick turnover", improve the ability to resist risks, join up to the high-end products to compete with developed countries.

3.2 How to hold back Anti-dumping lawsuit

Anti-dumping cases form the United States china has been faced with are concentrated in low-end products, including cold-rolled carbon steel, apple juice concentrate, brush, aspirin, paper clips, etc. The amount of China exports to the United States each year accounted for only 8% of the total, while the U.S. anti-dumping cases to china are accounted for more than 20% of the total, much higher than other countries and regions. From this point of view, the U.S. anti-dumping action is a way of protecting a domestic industry against China. In addition, the issue of Sino-US trade friction is also focused on the exchange rate, the United States claimed that the RMB is seriously undervalued, China maintain stability of currency in order to promote export growth. With the higher class of the Sino-US trade disputes and the constant pressure form the U.S. government, RMB was forced to revaluate in 2007. RMB appreciation makes Chinese exports products, relative to other countries, become more expensive, which has been weakened competitive advantage of a low-cost, china exports situation further deteriorated. However, China's government has not taken the way of export subsidies to maintain the export growth rate, while serve the appreciation of the RMB as an opportunity to guide China's exporters achieving the transition. At the beginning of 2008, in line with the restructuring of domestic exports, China's government further expand the area of domestic exports tax rebate. The cancellation of the export tax rebate in some fields means that many of exporters in these fields will have to face the bankruptcy, also means that surviving export enterprises must chose a new way to go. Our export enterprises must be based on scientific and technological progress to achieve industrial upgrading and structural optimization, pay attention to product quality and enhance the value-added, no longer blind pursuit of the low-cost which brought about by economies of scale, Gradually

change "the expansion mode of export number" to "the enhancement model of the export effectiveness". The ultimate realization of the "knowledge-intensive products" substituting for "labor-intensive products" fundamentally put an end to the struggle of anti-dumping lawsuit.

3.3 How to remove pressures of labor and environmental standard

In recent years, the rapid growth of China's fixed asset investment has led to the great contradictions between increased production capacity and constraints of resource and environment. Resources and the environment carrying capacity have reached its limit, to achieve industrial upgrading and transform the measure of industry growth no longer to delay. Otherwise, the green barriers form developed countries like the nightmare of China's exports trade in general winding and lingering. Although we know very well that the U.S. green barriers, to some extent, are man-made cards. However, we protest the inequality of the international competitive environment, we should more make Soul-searching and find out ourselves' crux. In term of the unit energy consumption and emissions, China is much higher than the United States. As a result, in accordance with the requirements of environmental protection, both the implementation of energy-saving and emission reduction and the achievement of saving water and energy and reducing consumption is the first step for China to defeat the green trade barriers. At present, the most authoritative environmental management standard all over world is ISO14000, which has developed a series of comprehensive standards collecting advanced environmental management experience and offers a suit of prevention-oriented management measures to reduce environmental pollution. Now many countries around the world serve 1SO14000 as a market access certification and refuse import products which do not meet the criteria. Therefore, to obtain certification will help break the green barriers. In the future, in order to bypass a "green barriers" the United States set up, China's foreign trade companies should strive to achieve not only through ISO9000 quality system but also through ISOI4000 environmental quality System, produce qualified products provided with quality assurance and environmental quality assurance.

4. The outlook of Sino-US trade relations

In the case of Sino-US trade friction to sustain, we should not hold a dispute between two sides and should seek more common interests between two sides. The divergence of economic structure between China and the United States make their import and export trade oppose highly complementary. China has a huge advantage in labor cost and unique comparative advantages in economies of scale, which provide a solid expansion space for the expansion of any industry. With the next phase of our economic growth, the domestic market will further develop and grow. The huge potential capacity of domestic consumptive market in the next few years will absorb a large number of products, which provides a potential opportunity for the United States' export trade. The essence of Sino-US economic relationship is mutual benefit and interdependence. This relationship between China and the United States not only has brought great benefits for the two countries' peoples, but also promoted the growth of the world economy. Although the way ahead will be a lot of problems, but the foundation of Sino-US economic and trade development is solid. As long as both sides work together by strengthening high-level bilateral dialogue and effectively consultative mechanisms and promote mutual understanding and trust, Sino-US trade prospects are bright.

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Assessment of Property Management Service Quality

of Purpose Built Office Buildings

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Abstract

Service quality has many benefits including achieving and sustaining a competitive advantage as determinant of business success and failure and as a barometer of corporate performance. In the service industry like the property management, quality and perception of quality is essential. Thus, the need to deliver quality service is imperative in order to retain tenants as services is the criteria upon which clients, customers and users of real estate product and services differentiate one organization from another. The purpose of the study discussed in this paper is to develop PROPERTYQUAL, a service quality instrument for property management profession and to contribute to research that analyses the relationship between expectations and perceptions of service quality. It also aims to use a gap analysis based model to measure tenants' perceptions of service quality in the property management of purpose built office buildings in Malaysia. This study utilizes a combination of quantitative and qualitative approach to research which allow triangulation of the findings and also enable the use of one method to inform the other, reveal paradox or contradictions, and extend the breadth of inquiry. The Cronbach alpha and CFA analysis confirmed that PROPERTYQUAL is a robust instrument to measure service quality in the property management services. The current findings do provide some important insights of understanding the variables that contribute to service quality and tenants satisfaction of property management services. This research has added to the base of knowledge regarding the assessment of service quality and tenant satisfaction in property management services and highlights areas for future research.

Keywords: Service quality, Property management, Purpose built office buildings

1. Introduction

Property management is a very demanding and challenging profession. It involves organizing an efficient system as well as directing, coordinating and controlling all the skills available towards maximizing income from a property and at the same time ensuring maximum protection of its fabric from deterioration and wastage through proper upkeep and maintenance (Scarrett, 1986).

The requirement for high standard of service quality in property management has grown through the years due to the fact that tenants have become more demanding in an increasingly competitive business environment.

Since the beginning of 1990s, both marketing and management literature and research have witnessed a growing interest in service quality (Parasuraman et al, 1985; 1988; Gronroos, 1998). Delivering service quality is considered an essential strategy for success and survival in today's competitive environment (Parasuraman et al 1985; Schieder and White, 2004). Property industry is one of the service industries that play a significant role in most economies. Thus, this study aims to develop a service quality instrument for property management services and hence, used the instrument to measure the service quality in property management services in Malaysia

2. Problem Statement

Tenants are now increasingly aware of and concerned about the level of service they receive. Bell (2001) claimed that the top criteria for improving retention are service improvements and service relationship. This means that property managers must be able to create lasting tenant relationships, achieve the highest level of tenant satisfaction and retention, and able to combine industry knowledge with their business acumen (CEL & Associates, 2001). Moreover, office building has become even more sophisticated and applying high technology – and this requires a very knowledgeable manager to manage it effectively and efficiently. These have also made the property management profession a rapidly growing profession, attracting many new entrants into the market (Chin & Poh, 1999). Therefore in order to remain competitive, property manager must listen and respond to tenants' needs, concerns and expectations, as well as opinions, and use this information to quantify their performance and compare them with best practice (Muhlebach, 1998).

Chin & Poh (1999) argued that due to the increase in expectations of tenants and the growth in the economy, there is a growing awareness of the need among buildings owners, professionals, and the authorities to raise the standard of property management practice. Their studies in Singapore showed the profession is lagging behind their counterparts such as manufacturing and constructions in implementing quality as part of their management tools. A review on The Surveyor, a professional journal by Institution of Surveyor Malaysia, since 1980 to date reveals that no article has mentioned about service quality in the property management profession in Malaysia. A study on the status of property management practice in Malaysia showed that only 30% of the property managers use quality as their management tool (Zarita et al, 2004). It also showed that property managers have focused only on those performance variables that can be easy and readily available for example the investment based performance measurement and the occupancy cost performance. That is basically the reason why property management industry is very slow in adopting such measure. The property managers have been forced to measure end results as opposed to the incremental processes that actually combine to make up the end result. These measurements tend to explain 'what' but provide little insight into the 'why'. As a result, the manager can only hypothesize or make guess regarding the actual cause (Schwenker, 1999).

In the property industry, outstanding tenants' service means meeting and anticipating the tenant needs. This is because tenants are the lifeblood of a property management companies. Negative tenant relations can have a serious effect on property returns, as letting space is the prime income generator for the owner and the management company. A recurring problem is that tenants' needs and dissatisfactions are discovered too late, as when a tenant announces he will not be renewing the lease. There is no evidence that an instrument of service quality in the property management service has ever been established. Measurement is a prerequisite for anything which is to be improved and property management is no exception. Thus, this research is aimed at developing a service quality instrument for the property management services.

A study on the status of property management practice in Malaysia showed that only 30% of the property managers use quality as their management tool. It also showed that property managers have focused only on those performance variables that can be easy and readily available for example, the investment based performance measurement and the occupancy cost performance (Zarita et al, 2004). That is basically the reason why the property management industry is very slow in adopting such a measure. The property managers have been forced to measure end results as opposed to the incremental processes that actually combine to make up the end result. These measurements tend to explain *what* but provide little insight into the *why*. As a result, the manager can only hypothesise or make guess regarding the actual cause of their services or performance (Schwenker, 1999).

Managers need more useful performance data to help answer the 'why'. Thus, to answer the *why*, the property manager needs to focus on tenant-based performance measurement in order to set themselves apart from their competitor. It is imperative for the owner to attract and retain satisfied tenants for their property investments. In order to retain tenants, the property manager needs to pay more attention to the tenants, and that starts with a solid analysis of the company's performance (Muhlebach, 1998). Without this clear vision and correctly defined business practices and processes, an organization is doomed to lackluster performance and loss of business.

Despite the importance of measuring service quality across industries and nationwide, little empirical research has been conducted in the delivery of professional practice of property management services in Malaysia. This research is therefore, an effort to gain insight into the service quality of tenants and the property managers.

3. Service Quality

Service quality is an abstract and elusive concept because of the well-known distinctive features of services – intangibility, perishability, heterogeneity, and inseparatability of production and consumption (Zeithaml et al, 1985; Rust et al, 1996; Kotler and Armstrong, 2001). It is due to these features that definition of quality can vary from person to person, and from situation to situation (Kandampully, 2002).

Delivering quality service has many benefits including achieving and sustaining a competitive advantage (CEL and Associates Inc, 1996; Lee and Dean, 1998), as determinant of business success and failure (BOMA, 1998) and as a barometer of corporate performance (Javitch et al, 1995). In the service industry like the property management, quality and perception of quality is essential. Thus, the need to deliver quality service is imperative in order to retain tenants as services is the criteria upon which clients, customers and users of real estate product and services differentiate one organisation from another (CEL and Associates Inc, 1996).

Perceived service quality, was defined as the difference between customer expectations and perceptions or also known as gap analysis (Parasuraman et al, 1985; 1988). The gap analysis model is based on the expectancy disconfirmation theory. Expectancy disconfirmation theory predicts that customers will judge that quality is low if performance does not meet their expectations and quality increases as performance exceeds expectations (Oliver, 1980). Hence, customers' expectations serve as the foundation on which service quality will be evaluated by customers. In addition, as service quality increases, satisfaction with the service and intentions to reuse the service increase.

4. A Service Quality Model

A model is useful in providing insights into the complexity of service quality. SERVQUAL is an instrument to specifically measure service quality (Parasuraman et al 1985, 1988; Zeithaml and Bitner, 2003). SERVQUAL is composed of the five factors, reliability, assurance, tangible, responsiveness, and empathy. Parasuraman et al (1988) claimed that SERVQUAL provides a basic framework through its expectations or perceptions format encompassing statements for each of the five service quality dimensions. The skeleton, when necessary, can be adapted or supplemented to fit the characteristics or specific research needs of a particular organisation. Babakus and Boller (1992) commented that the domain of service quality may be factorially complex in some industries and very simple and uni-dimensional in others. The number of service quality dimensions is dependent on the particular service being offered. Nonetheless, researchers generally agree that the scale items are good predictors of overall service quality (Swartz and Brown, 1989; Carman, 1990; Parasuraman, 1998; Bolton and Drew, 1991; Cronin and Steven, 1992). In fact, Gronroos (1998) has labeled SERVQUAL as the best measurement for service quality. Since the introduction of the SERVQUAL, it has become the favourite, the most adopted, the best service quality measurement applied across industries and nationwide. The majority of studies do support the applicability of the SERVQUAL instrument as the only tool that has been tested statistically in terms of validity and reliability, for measuring service quality.

There is a dearth of research into service quality in the property industry. To date there are six service quality research and all in the estate agency services (Johnson et al, 1988, Mc Daniel et al, 1994, Nelson et al, 1995, Seiler et al, 2000, Teoh, 2004 and Pratibha et al, 2005). This support the much needed research of service quality in the property management services as none has been done to date, particularly in property management service in Malaysia.

5. The Conceptual Framework

In order to develop a service quality instrument or PROPERTYQUAL, a conceptual framework needs to be established. The process of developing a conceptual framework involves two stages. Firstly is the identification of constructs to be included in the framework and secondly is the identification of dimensions. This chapter has looked at the service quality model from various studies, namely Gronroos (1998), Parasuraman et al (1985, 1988), Rust and Oliver (1994) and Brady and Cronin (2001). The comparison from various studies can be concluded that there are at least two constructs namely construct before and after the quality action is needed in a service quality framework. Any additional construct can be added accordingly or depending on the industry understudy. This study has identified Functional as the construct before quality action and Technical as the construct after quality action.

The identification of the dimensions involves dimensions for the Functional construct and dimensions for Technical construct. The researcher has adopted Parasuraman et al (1988) the five service quality dimensions to reflect the Functional construct namely, reliability, assurance, tangibles, empathy and responsiveness. The justification for this is because (i) the five dimensions is short and comprehensive to measure the Functional construct, (ii) this is based on empirical and statistical analysis, and (iii) it has the SERVQUAL instrument. Technical dimensions are solely based on literature review. Five dimensions have been chosen namely cleanliness, building services, signage, security and parking as a robust and comprehensive to cover the property management services. Additional dimension to be included

in this framework is Image construct to reflect the important of branding and competitive advantage of image in property industry. The focus of image in this study is on what is inside the four walls and excluding the design of a building. This is due to the fact that design is very subjective and the tenants occupy the building after it has been built. In addition, the researcher has verified the five dimensions of Technical construct and one dimension of Image construct using the panel of property managers in practice. The feedback is used to confirm the dimensions in this study.

It is essential to look at the development of service quality model and dimensions from previous studies. A synthesis of the service quality model will give rise to important elements or constructs that should be included in a model. In addition a synthesis of dimensions from previous studies will give rise to dimensions that is appropriate to a particular study i.e. property management services. The analysis is meant to look at the holistic view of the previous studies and comprehend the elements and dimensions used in the studies. Services are unique in nature and no two services are the same, thus each of the studies has been tailored to a particular services or industry understudy.

The development of a conceptual framework for service quality in the property management services is important in order to measure the gap between tenants' and property managers' expectations and perceptions. This is due to the fact that there is of no evidence that a service quality framework for property management services is in existence. This conceptual model has identified the dimensions and construct for property management services. The service quality framework for property management services is illustrated in Figure 1 below.

There are three stages in the framework development. The first stage is the dimensions of service quality for the property management services. For the purpose of this study the dimensions is divided into two groups, the SERVQUAL and the property dimensions. SERVQUAL is used in this framework to demonstrate that this study is a modified SERVQUAL which has been developed by Parasuraman et al (1985, 1988). The purpose of this modification is to reflect the industry or service understudy or particularly the property management service. The second phase explains the constructs of property management service. There are three constructs that explained property management service quality; (i) functional which represent element/service judged before (five dimensions), (ii) technical represent element/services judged during (five dimensions), and (iii) image represent the additional elements which is the building aesthetics (one dimension). The third stage involves a gap analysis (Zeithaml et al, 1985) i.e. measuring the gap between level of expected service and perceived service of both the tenants and property managers. A gap analysis provides a systematic framework to identify the relevant outcomes and benchmark measures necessary to determine service quality beyond satisfaction measures (Selz, 1997).

Based on this conceptual framework, a service quality instrument or PROPERTYQUAL is established. The PROPERTYQUAL is a service quality questionnaire developed in the real estate context focusing on the purpose built office buildings. The target groups for this study are the tenants as well as the property managers of purpose built office buildings.

6. PROPERTYQUAL as a Service Quality Instrument

The instrument used in this study was a modification of SERVQUAL (Parasuraman et al 1985, 1988), which has a 54 item self completed questionnaire that measured customer expectations and perceptions of service quality. The instrument that has been developed is named Property Management Service Quality Instrument or PROPERTYQUAL. PROPERTYQUAL measures expectations and perceptions of service quality along five dimensions of service quality determinants (Parasuraman et al 1998) and other six dimensions.

SERVQUAL was modified in the present study to reflect the nature of property management services. Parasuraman et al (1988) indicated that such modifications were appropriate and do not represent difficulties related to the reliability and validity of the instrument. The revisions included (i) using the property management and tenant in the instrument rather than company and customer, (ii) adding new dimensions to the instrument to reflect the property management profession. The new dimensions or the property dimension includes cleanliness, building service, signage, security, parking, and building aesthetics. Table 1 below summarizes the characteristics of SERVQUAL and PROPERTYQUAL.

7. Research Methodology

7.1 Research objectives

This study has addressed the following objectives and research questions;

(i) To develop PROPERTYQUAL, a service quality instrument for property management services.

(ii) To measure tenants' and property managers' perceptions of service quality in the property management of purpose built office buildings in Malaysia using PROPERTYQUAL.

7.2 Research design

A mixed-methodology or triangulation design of the study incorporates the use of quantitative and qualitative paradigm (Creswell, 1994). Results of the quantitative mail survey in the study are used to answer research question 1 to 5. In

addition results from the qualitative are used to verify the findings and to further explain factors that influence service quality amongst tenants' and property managers.

The study was conducted to privately owned purpose built office buildings in Kuala Lumpur with a population of 318 buildings. For the purpose of this study, the whole population of purpose built office buildings in important location was considered. The reason for this is due to the low rate of response, thus, it is appropriate that we take the whole population rather than the subset of it.

The instrument used is PROPERTYQUAL, a modified SERVQUAL developed by Parasuraman et al (1985, 1988). The SERVQUAL measure has proven to be reliable in other applications. The variables for this study are the 11 dimensions of service quality as presented by 54 scale items which has been developed purposely to reflect the service understudy. Data was collected by method consistent with the research design. Data analysis was also based on the research design, and also assumptions of normality for the population. Figure 2 provides a summary of the research design.

8. Empirical Findings

8.1 Internal Consistency of the PROPERTYQUAL Instrument

The internal consistency of the PROPERTYQUAL instrument was assessed through eleven dimensions of Functional, Technical and Image constructs. The five dimensions; tangibles, responsiveness, empathy, reliability and assurance were used as indicators of the Functional construct. Other dimensions; cleanliness, building services, signage, security and parking were used as indicators of Technical construct while building aesthetics was used as an indicator of Image construct. Both expectations and perceptions scores for each dimension were assessed using Cronbach's Alpha. The results are summarised in Table 2.

It can be clearly seen in Table 2 that all the dimensions of PROPERTYQUAL have a high internal consistency as the Alpha's coefficient for both expectations and perceptions are above 0.90. Furthermore, the overall Alpha for the entire 54 items of expectations and perceptions are also high (0.992 and 0.989, respectively). Therefore, it can be concluded that PROPERTYQUAL instrument is reliable and applicable to be used for measuring property management services quality.

8.2 Goodness-of-Fit of the Model

Confirmatory factor analysis (CFA) was carried out to assess the overall goodness-of-fit of the model being hypothesised. The model fit for each construct was assessed using Normed Fit Index (NFI), Relative Fit Index (RFI), Incremental Fit Index (IFI), Tucker-Lewix Index (TLI), Comparative Fit Index (CFI) and Root-Mean-Square Residual (RMR). For the index, values of 0.90 or higher suggest that the data fit the model well (Bentler and Bonett, 1980).The smaller the RMR the better the goodness of fit. An RMR of 0 indicates a perfect fit. The results of confirmatory factor analysis (CFA) constructs in this study are summarised in Table 3.

Overall, the data fit the model well for all constructs as the index are above 0.90 though the data fit relatively well for technical (NFI = 0.853, RFI = 0.836, IFI = 0.877, TLI = 0.863 and CFI = 0.877). Moreover, a small value of RMR for each construct supports that the data fit the model well.   Therefore, no necessary changes were made for the structure of those constructs.

8.3 The discrepancies of expectations and perceptions between tenants and property managers

There are discrepancies of expectations and perceptions between tenants and property managers. Figure 3 below illustrates the discrepancies or gap scores between tenants and property managers. It showed that property managers were found to have lower gap scores in all dimensions than tenants. This concludes that property managers were less satisfied towards the perceptions of service quality compared to tenants.

This is due to the multidimensional characteristic of human being which in turn will be influence by culture, subculture, social class, family, friends, institutions, experiences, mass media, advertising etc. However, in regards to the property managers although they are the service providers but the discrepancies existed are basically influenced by the humanism characteristics of their sub-ordinate under the managers' supervision, which some of the sub-ordinate's actions (how they handle their job, courtesy, empathy etc.) is beyond the control of the managers.

8.4 Property managers' perceptions

Based on the mean score of perception (Table 4), property managers' perceptions perceived higher towards the dimensions of PROPERTYQUAL than tenants. This showed that property managers have better understanding of service quality than the tenants. This is basically due to the property managers understanding and awareness to manage property effectively and efficiently.

8.5 Level of importance towards the dimensions of PROPERTYQUAL

The study showed that based on the score of importance (Table 5) of the service dimension, reliability and responsiveness are found to be more important to the tenants than to the managers. However, assurance and reliability

are shown to be more important to the managers than to the tenants. For the property dimensions, it was found that the tenants perceived cleanliness, security and building services as the top three ranking. Property managers on the other hand perceived cleanliness, and building services as the top three ranking.

8.6 Signage and building aesthetics dimensions and tenants' overall service quality perception

The study revealed that signage and building aesthetics have a positive effect on tenants' overall service quality perception. Signage has a greater influence compared to building aesthetics as indicated by the coefficients.

8.7 Reliability dimension and property managers' overall service quality perception

The multiple linear regression analysis found that only reliability has a significant positive effect on property managers' overall service quality.

8.8 Technical and Image constructs and perceptions of overall service quality

A path analysis has been carried out and revealed that Technical and Image influence perceptions of overall service quality in the property management of purpose built office buildings in Malaysia. Technical and Image constructs is actually property management based variables. This shows that service quality is highly influenced by property management related variable (cleanliness, building services, security, parking, signage and building aesthetics) and not by process or service delivery variables namely reliability, assurance, tangibles, empathy and responsiveness (Figure 4).

9. Conclusion

This study has developed PROPERTYQUAL, an instrument to measure service quality in property management of purpose built office buildings in Malaysia. PROPERTYQUAL has been developed thoroughly based on the conceptual framework and supported by the statistical analysis; it has been proved to be a reliable and valid instrument. Thus, this confirmed that PROPERTYQUAL is a robust instrument to measure service quality in the property management services. Further to that, this study has used PROPERTYQUAL to measure the perceived service quality of tenants and property managers. It is important to understand the expectations and perceptions of tenants and property managers in the property management services. The use of modified SERVQUAL and the development of PROPERTYQUAL offer the property management companies a diagnostic and disciplined methodological approach to assessing service quality within the property industry. The property management company is now able to make decisions about service improvement and tenants' satisfaction. Using PROPERTYQUAL allows the property manager to look specifically at the different dimensional measures of service quality in different ways. Figure 5 below illustrates the PROPERTYQUAL methodology.

This study is a starting point for the property management company to comprehend the relative degree of satisfaction and dissatisfaction of the tenants. This is a major contribution of this study whereby this information is non-existence before. Improvement and strategies for the betterment of the property management profession could be made accordingly. The study revealed that signage and building aesthetics would improve service quality and tenants' satisfaction. On the other hand, from a property management company's point of view, a lot of effort is needed to improve the property management companies on managing property effectively and efficiently and educating the property managers and staffs on how to deliver quality service. Although property management companies in Malaysia do measures their performance but none of the evaluation have provided information to management that PROPERTYQUAL provides for decision making.

The amount of research pertaining to service quality and tenants' satisfaction in the property industry is increasing, and there are still areas for future research. First, PROPERTYQUAL should also be tested to other property sectors; residential, commercial, industrial and special properties. This can also include comparing service quality and tenants' satisfaction between public and private buildings. Secondly, further research can analyze the barriers to implementing programs of service quality as well as tenants' satisfaction and ways to overcome those barriers. In addition, efforts should be made to narrow down the gap of perceptions between tenants and property managers. Thirdly, future research should also go beyond the dimensions investigated in this research to include other dimensions of quality, particularly culture which may be challenging in a multi-races country. Fourthly, in the context of property management services, future research can also explore new techniques (quantitative and qualitative) that provide meaningful insights into service quality and tenants' satisfaction.

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Table 1. Summary of SERVQUAL and PROPERTYQUAL

Name	**SERVQUAL**	**PROPERTYQUAL**
Constructs	Functional	Functional
		Technical
		Image
Dimensions	Reliability	Reliability
	Assurance	Assurance
	Tangibles	Tangibles
	Empathy	Empathy
	Responsiveness	Responsiveness
		Cleanliness
		Building services
		Signage
		Security
		Parking
		Building Aesthetics
Item	22	54

Table 2. Reliability coefficients for eleven dimensions of PROPERTYQUAL

Constructs	Dimension	Number of items	Alpha's Coefficient	
			Expectations	Perceptions
Functional	Reliability	5	.946	.953
	Responsiveness	3	.952	.947
	Assurance	4	.937	.944
	Empathy	4	.967	.963
	Tangibles	5	.967	.968
Technical	Cleanliness	8	.970	.966
	Building services	12	.978	.971
	Signage	3	.952	.912
	Security	2	.948	.938
	Parking	3	.953	.954
Image	Building aesthetics	5	.949	.964

Table 3. Goodness-of-Fit Indicators of Models for the Three Constructs

Construct	[a] NFI	[b] RFI	[c] IFI	[d] TLI	[e] CFI
Functional	.933	.921	.951	.942	.950
Technical	.853	.836	.877	.863	.877
Aesthetics	.972	.944	.975	.949	.975

Note: * $p<0.05$

[a] Normed Fit Index, [b] Relative Fit Index, [c] Incremental Fit Index, [d] Tucker Lewis Index, [e] Comparative Fit Index

Table 4. Mean scores of perceptions of the eleven dimensions of PROPERTYQUAL

Dimension	Mean score of perceptions	
	Tenant	Manager
1. Reliability	4.66	5.52
2. Responsiveness	4.68	5.63
3. Assurance	4.73	5.52
4. Empathy	4.56	5.42
5. Tangibles	4.55	5.36
6. Cleanliness	4.84	5.53
7. Building services	4.80	5.49
8. Image	4.67	5.54
9. Signage	4.63	5.47
10. Security	4.82	5.73
11. Parking	4.50	5.47

Table 5. Mean scores of importance of the eleven dimensions of PROPERTYQUAL

Dimension	Mean score of importance	
	Tenant	Manager
1. Reliability	23.67	20.89
2. Responsiveness	22.96	19.95
3. Assurance	22.49	21.30
4. Empathy	15.87	19.95
5. Tangibles	15.01	17.92
6. Cleanliness	20.419	20.680
7. Building services	18.237	19.560
8. Image	16.617	15.820
9. Signage	11.579	12.060
10. Security	19.225	19.100
11. Parking	13.998	12.780
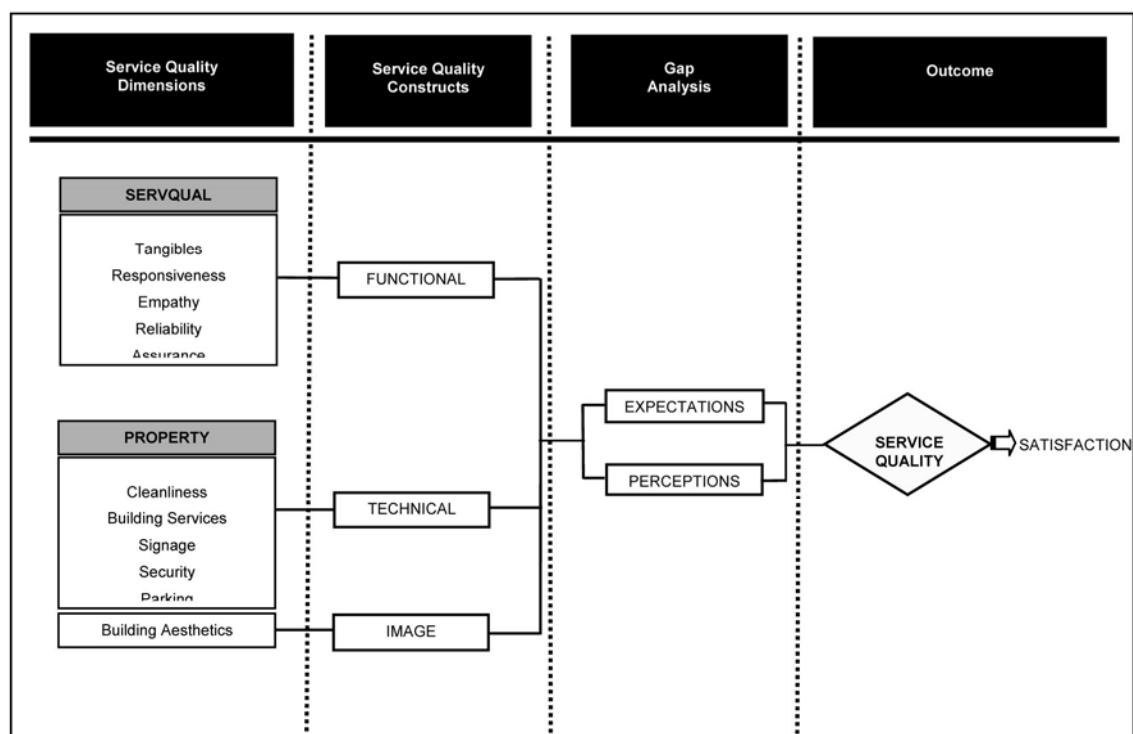
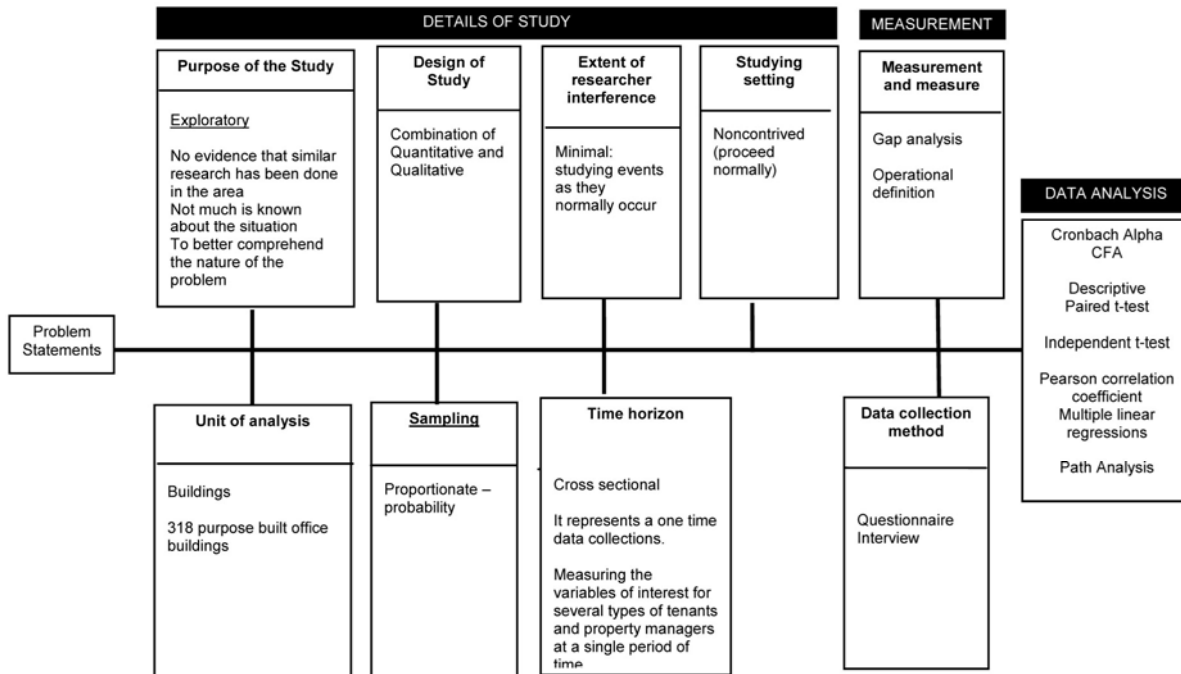Figure 1. Service Quality Framework for Property Management Services

DETAILS OF STUDY				MEASUREMENT
Purpose of the Study Exploratory No evidence that similar research has been done in the area Not much is known about the situation To better comprehend the nature of the problem	**Design of Study** Combination of Quantitative and Qualitative	**Extent of researcher interference** Minimal: studying events as they normally occur	**Studying setting** Noncontrived (proceed normally)	**Measurement and measure** Gap analysis Operational definition

DATA ANALYSIS

Cronbach Alpha CFA

Descriptive Paired t-test

Independent t-test

Pearson correlation coefficient
Multiple linear regressions

Path Analysis

Problem Statements

| **Unit of analysis**

Buildings

318 purpose built office buildings | **Sampling**

Proportionate – probability | **Time horizon**

Cross sectional

It represents a one time data collections.

Measuring the variables of interest for several types of tenants and property managers at a single period of time | **Data collection method**

Questionnaire Interview |

Figure 2. Summary of Research Design

Dimensions	Tenants' gap score	Property Managers' gap score
Reliability	-1.89	-1.26
Responsiveness	-1.86	-1.15
Assurance	-1.82	-1.26
Empathy	-1.88	-1.23
Tangibles	-1.95	-1.32
Cleanliness	-1.72	-1.26
Building services	-1.75	-1.3
Signage	-1.92	-1.34
Security	-1.76	-1.11
Parking	-2.04	-1.27
Building aesthetics	-1.91	-1.28
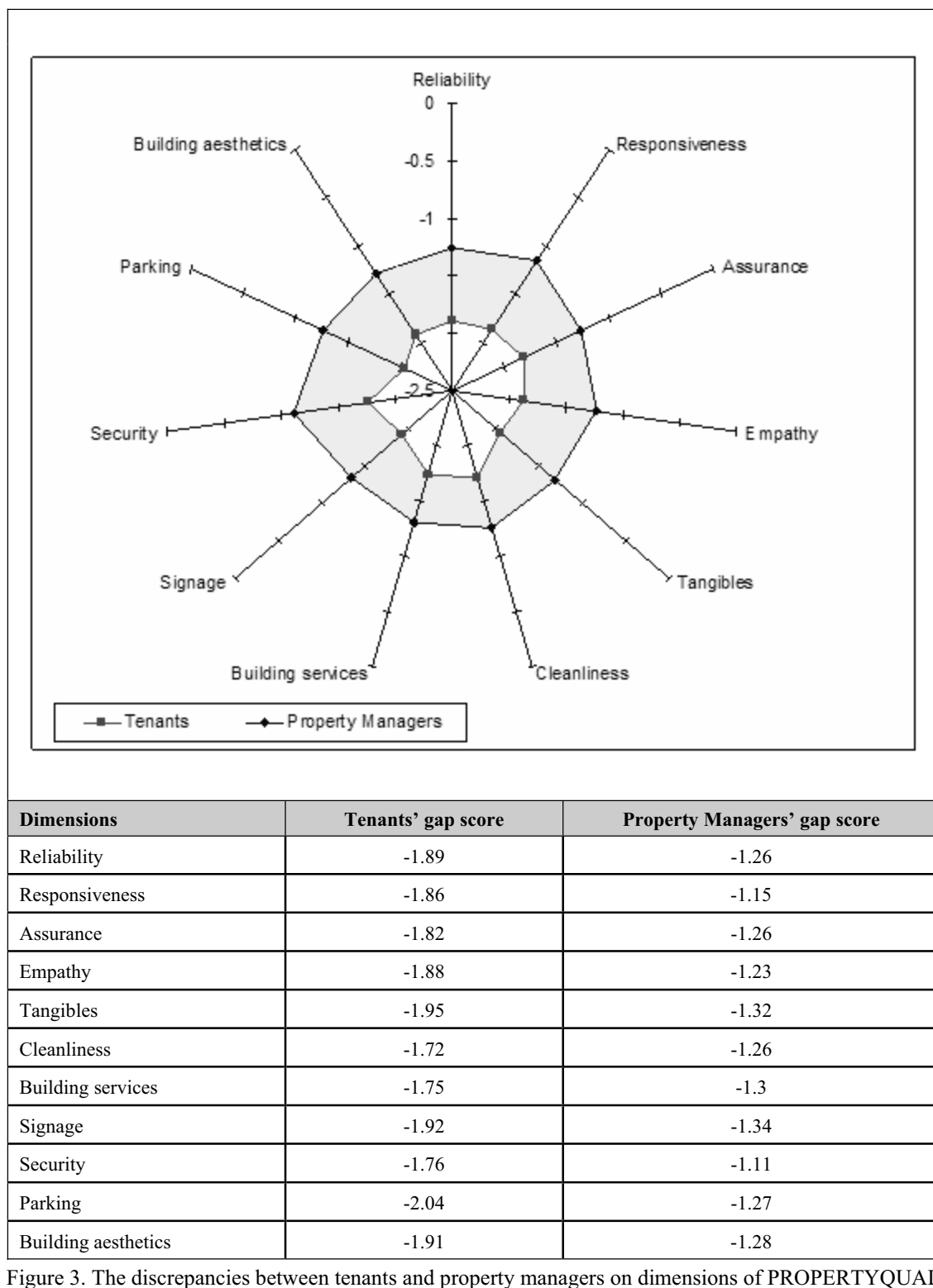
Figure 3. The discrepancies between tenants and property managers on dimensions of PROPERTYQUAL
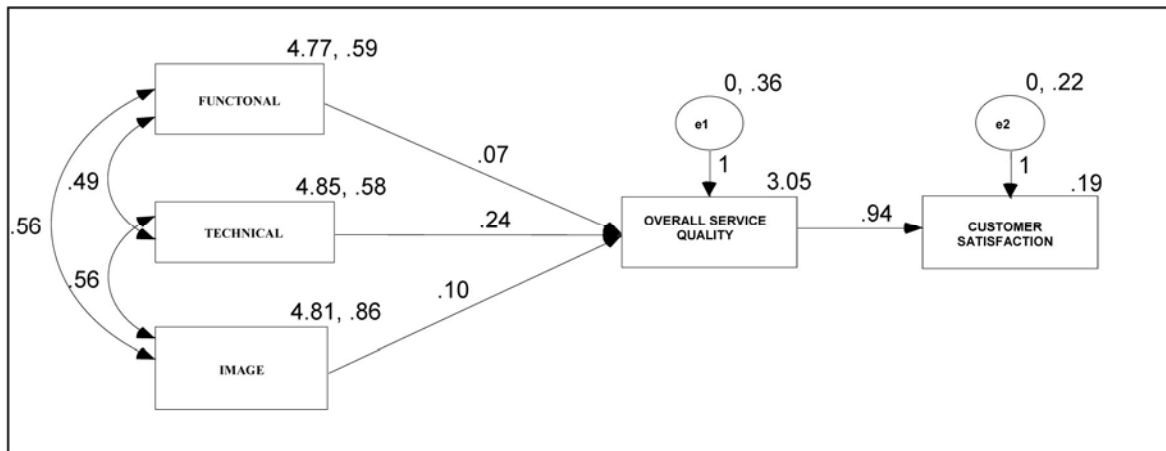
Figure 4. The Path Diagram
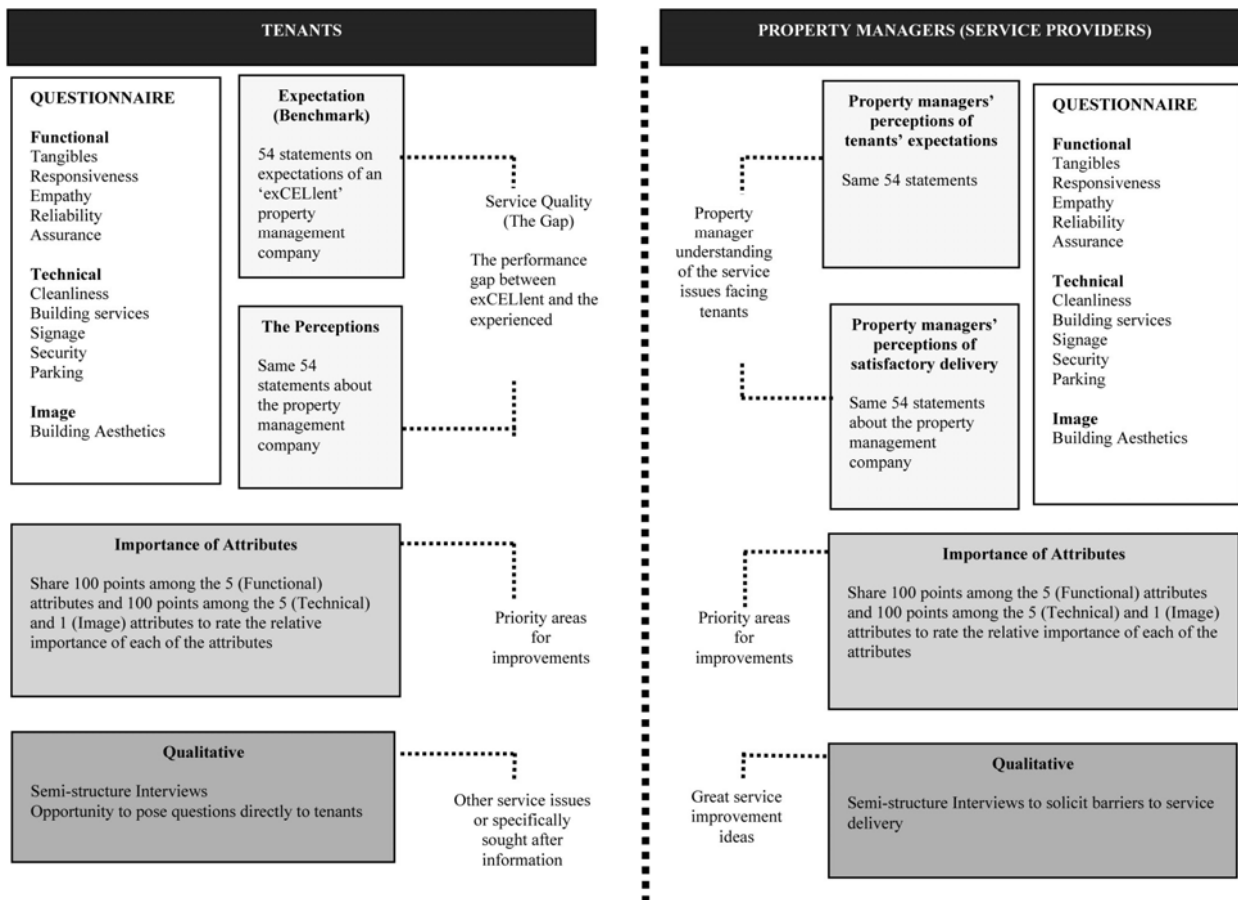
Figure 5. PROPERTYQUAL: Methodology

Unbalanced Bidding Problem with Fuzzy Random Variables

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Abstract

Unbalanced bidding problem with mixed uncertainty of fuzziness and randomness is considered in this paper, where the bidding engineering quantities of each activity are assumed to be fuzzy random variables. Two types of fuzzy random models as expected value maximization model and maximax chance-constrained model are built to satisfy different optimization requirements. Then a hybrid intelligent algorithm integrating fuzzy random simulations, neural network and genetic algorithm is designed to solve these models. Finally, a numerical experiment is given to illustrate its effectiveness of the algorithm. The results show that the algorithm is feasible and effective.

Keywords: Unbalanced bidding, Fuzzy random variable, Fuzzy random programming, Hybrid intelligent algorithm

1. Introduction

With the further development of the bid mechanism, the engineering item invitation has already become more and more standardized. How to master the strategy of invitation, increasing the efficiency of bids is very important for the bidders. In order to make the bid price more competitive and obtain sufficient profits in engineering bids, they can use many kinds of methods to calculate the bid price, including unbalanced bidding, unexpected markdown, loss-first-profit-later quotation, multiple alternative quotation, etc. On the whole, unbalanced bidding is the most widely used tactic.

Unbalanced bids is opposite to the conventional balanced bids, which is a wide-used method in the optimization of unit price internationally. It can be described as follows: after the contractors carry on the resource distribution, the cost analysis and the research of bidding skills according to bills of quantities provided by the owners, they enhance some comprehensive unit price in bills of quantities consciously and reduce other comprehensive unit price simultaneously in order to obtain more economic benefits without raising the total price.

Unbalanced bids is divided into two types of "earlier receiving money" and "more receiving money". However, how to realize these two types lacks quantitative optimization models and efficient algorithms, so it can bring randomness and

blindness in process of bidding. In order to solve this problem, many researchers at home or abroad have carried on extensive research. Dayanand and Padman (1997, p.906 & 2001, p.197) initially established optimal models of the project payment scheduling problem from contractor′s and client′s viewpoints respectively, also presented a heuristic algorithm to find the payment schedule of maximizing project profits. Afterwards Ulusoy et al. (2000, p.262) introduced a method of seeking the equal payment scheduling from both sides of contractor and client. In China, the research of this problem is still on the beginning period, and most researches were presented theoretically. Xu (1990) ′ s research result in the field of project cost management has laid a solid theoretical foundation for other researchers; After that, Zhang et al. (2005, p.595) studied bids strategy via the game theory, using the characteristics of engineering quality list in the market economy. Chen et al. (2005, p.118) built linear programming models with objective of maximizing surplus profits according to the fundamental principles and the conditions of unbalanced bids; He and Xu (2007, p.474) set up nonlinear mixed integer programming models from contractor′s and client′s viewpoints respectively, also designed the two-module simulated annealing heuristics algorithm to solve these models. Generally speaking, most of these researches were built in certain environments, and the results showed that it could be optimized to give the best present value of actual payment without raising the total price when the unit price of front activities were enhanced by 10% and the unit prices of following activities were reduced by 10%.

Nevertheless, in real world, unbalanced bids is a complex problem. If contractors overuse unbalaned unit price, it can not only bring the loss to contractors or influence winning a bid, but also result in the serious trouble and increase the investment risk to clients during the project management process. Due to the uncertainty of budget engineering quantities and substitution of main components in each activity, it is difficult for contractors to estimate bidding engineering quantities of each activity accurately. Therefore, there is a need to study unbalanced bidding problem in uncertain environments so as to make the contractors' bid price more competitive and improve the practical application value of unbalanced bids.

Furthermore, fuzziness and randomness sometimes may co-exist in unbalanced bidding problem. In a bidding project, some bidding activities may seldom or never be performed, of which bidding engineering quantities can be described by fuzzy variables, while some other bidding activities may have been processed many times before, of which bidding engineering quantities can be summarized by random variables. In this case, fuzzy random variable, which was initialized by Kwakernaak (1978, p.1), can be introduced as a useful tool for optimization problems with mixed uncertainty of fuzziness and randomness.

To the best of our knowledge, there is little research for unbalanced bidding problem with the uncertainty of combining fuzziness and randomness. In this paper, we try to consider the unbalanced bidding optimization problem when the bidding engineering quantities of each activity cannot be known precisely. We regard the bidding engineering quantities of each activity as fuzzy random variables. This paper will effectively solve unbalanced bidding problem with mixed uncertainty of fuzziness and randomness. In Section 2 we recalls some basic concepts of fuzzy random variable which are necessary to understand the rest of the paper. Then some assumptions are given and the problem is described in detail in Section 3. According to the analysis of the problem, Section 4 builds two types of fuzzy random models as expected value maximization model and maximax chance-constrained model. Furthermore, in order to deal with fuzzy random models in Section 4, Section 5 integrates fuzzy random simulations, neural network and genetic algorithm to design a hybrid intelligent algorithm. To reveal the effectiveness of the hybrid intelligent algorithm, Section 6 gives a numerical experiment. Finally, some conclusions are drawn in Section 7.

2. Fuzzy random variable

In many cases, fuzziness and randomness simultaneously appear in an optimization framework. In order to describe this phenomena, the concept of fuzzy random variable was introduced by Kwakernaak (1978, p.1). Since then, this concept was developed by other researchers such as Colubi et al. (2001, p.3), Kruse and Meyer (1987), and Liu and Liu (2003, p.143) according to different requirements of measurability. In this paper, we adopt the defnition of fuzzy random variable given in Liu and Liu (2003, p.143) for fuzzy random optimization. For convenience, we shall recall briefly some basic concepts and results on fuzzy random variables.

Definition 2.1 (Liu and Liu (2003, p.143)). Let $(\Omega, \Sigma, \mathrm{Pr})$ be a probability space. A fuzzy random vector is a map $\xi = (\xi_1, \xi_2, ..., \xi_m) : \Omega \to F_V^m$ such that for any closed subset C of R^m,

$$\xi^*(C)(\omega) = Pos\{\xi(\omega) \in C\}$$

is a measurable function of ω, where F_V^m be a collection of fuzzy vectors defined on a possibility space, and each element X of F_V^m is characterized by a possibility distribution function μ_X of the fuzzy vector X. If $m = 1$, then ξ is called a fuzzy random variable.

Theorem 2.1 (Liu and Liu (2003, p.143)). If ξ be a fuzzy random variable, then the expected value $E[\xi(\omega)]$ of fuzzy variable $\xi(\omega)$ is a random variable.

Definition 2.2 (Liu and Liu (2003, p.143)). Let ξ be a fuzzy random variable defined on the probability space $(\Omega, \Sigma, \mathrm{Pr})$. The expected value of the fuzzy random variable is defined by

$$E[\xi] = \int_{\Omega} \left[\int_{0}^{\infty} Cr\{\xi(\omega) \geq r\} dr - \int_{-\infty}^{0} Cr\{\xi(\omega) \leq r\} dr \right] \mathrm{Pr}(d\omega).$$

Definition 2.3 (Liu (2001, p.713)). Let $\xi = (\xi_1, \xi_2, ..., \xi_n)$ be a fuzzy random vector, and $f : R^n \to R^m$ be real-valued continuous functions. Then the primitive chance of fuzzy random event characterized by $f(\xi) \leq 0$ is a function from $[0,1]$ to $[0,1]$ such that for any given $\alpha \in [0,1]$, we have

$$Ch\{f(\xi) \leq 0\}(\alpha) = \sup\{\beta \mid \mathrm{Pr}\{\omega \in \Omega \mid Cr\{f(\xi(\omega)) \leq 0\} \geq \beta\} \geq \alpha\}$$

Where α is a prescribed probability level. The value of primitive chance at α is called α-chance.

Definition 2.4 (Liu (2001, p.713)). Let ξ be a fuzzy random variable, and $\gamma, \delta \in (0,1]$. Then

$$\xi_{\sup}(\gamma, \delta) = \sup\{r \mid Ch\{\xi \geq r\}(\gamma) \geq \delta\}$$

Is called the $(\gamma, \delta) - optimistic$ value to ξ, and

$$\xi_{\inf}(\gamma, \delta) = \inf\{r \mid Ch\{\xi \leq r\}(\gamma) \geq \delta\}$$

Is called the $(\gamma, \delta) - pessimisti\,c$ value to ξ.

Example 2.1 (Liu (2007)). Let $\bar{a}_1, \bar{a}_2, \cdots, \bar{a}_m$ be fuzzy variables defined on the credibility space $(\Theta, P(\Theta), Cr)$, and $p_1, p_2, \cdots, p_m$ nonnegative numbers with $p_1 + p_2 + \cdots + p_m = 1$. Then

$$\xi = \begin{cases} \bar{a}_1 & with \quad probabilit\,y \quad p_1 \\ \bar{a}_2 & with \quad probabilit\,y \quad p_2 \\ \cdots \\ \bar{a}_m & with \quad probabilit\,y \quad p_m \end{cases}$$

is clearly a fuzzy random variable.

Example 2.2 Let η be a fuzzy random variable defined as

$$\eta = \begin{cases} (-6,-4,-2) & with \quad probabilit\,y \quad 0.25, \\ (-2,0,2) & with \quad probabilit\,y \quad 0.5, \\ (2,4,6) & with \quad probabilit\,y \quad 0.25. \end{cases}$$

3. Problem Description

Before we begin to study unbalanced bidding problem with fuzzy random bidding engineering quantities, we first make some assumptions as:

(a) The contractor's anticipated starting time and duration time of each activity are the same as owner's;

(b) The interest rate doesn't change during the period of the project;

(c) Each activity should be processed without interruption;

(d) The owner decides payment according to the construction schedule of each activity;

(e) The last payment must be arranged when the total project is finished.

For simplicity, we assume that bill of quantity (BOQ) consists of n bidding activities, and the ith bidding activities have m main components, $i = 1, 2, \cdots, n$, respectively.

Next, in order to model unbalanced bids problem, we must introduce the following indices and parameters:

t_{si}: The starting time of the ith activities;

t_i: The duration time of the ith activities;

r: The interest rate;

k_i: The discounting coefficient of construction cost needed for the *ith* bidding activities, and it can be calculated by the following equation, $\quad k_i = \dfrac{(1+r)^{t_i} - 1}{t_i \cdot r \cdot (1+r)^{t_{si}+t_i}}$ (1)

P_i: The budget price for the *ith* activities;

$\overline{P_i}$: The bidding price for the *ith* activities;

q_{ij}: The budget engineering quantities for the *jth* components in the *ith* activities, $j = 1,2,\cdots,m$;

ξ_{ij}: The fuzzy random bidding engineering quantities for the *jth* components in the *ith* activities;

p_{ij}: The budget unit price of the client for the *jth* components in the *ith* activities;

x_{ij}: The bidding unit price of the contractor for the *jth* components in the *ith* activities;

According to the assumptions, the budget price of the client for the total project should be $P = \displaystyle\sum_{i=1}^{n} P_i$. (2)

The bidding price of the contractor for the total project is $\overline{P} = \displaystyle\sum_{i=1}^{n} \overline{P_i}$. (3)

The budget engineering quantities of the client for the *ith* activities should be $q_i = \displaystyle\sum_{j=1}^{m} q_{ij}$. (4)

The fuzzy random bidding engineering quantities of the contractor for the *ith* activities should be

$$\xi_i = \sum_{j=1}^{m} \xi_{ij}.$$ (5)

The budget price for the total project is $P_i = \displaystyle\sum_{j=1}^{m} q_{ij} p_{ij}$. (6)

The bidding price for the total project is $\overline{P_i} = \displaystyle\sum_{j=1}^{m} \xi_{ij} x_{ij}$. (7)

Therefore, the present value of the client's budget price for the total project can be written as

$$f = \sum_{i=1}^{n} k_i P_i.$$ (8)

The present value of the contractor's bidding price for the total project can be written as

$$\overline{f} = \sum_{i=1}^{n} k_i \overline{P_i}.$$ (9)

As these parameters and basic formulas have been given in the above section, we can establish different fuzzy random programming models to satisfy different optimization goals.

4. Fuzzy random models

4.1 Expected value maximization model

The first type of programming is fuzzy random expected value model(EVM), which optimizes the expected objective function subject to a set of expected constraints. It was introduced by Liu and Liu (2003, p.89). The fuzzy random expected value model is widely used to model practical problems with uncertain factors. In fuzzy random environments, objective functions and constraint functions always cannot be calculated directly. In practice, many decision-makers

may tend to optimize expected objectives. In this case, we can optimize expected objective function under some expected constraints by the method of EVM. Hence, in fuzzy random unbalanced bidding problem, the present value of the contractor's bidding price for the total project can be required to be maximized under some expected constraints. To satisfy this type of requirement, we can build an expected value maximization mode as:

$$
\begin{cases}
\max\ E[\overline{f}] = E[\sum_{i=1}^{n} k_i \overline{P_i}] \\
subject \quad to: \\
\quad E[\sum_{i=1}^{n} \overline{P_i} - \sum_{i=1}^{n} P_i] \le 0 \qquad\qquad (10) \\
\quad E[\sum_{i=1}^{n} \sum_{j=1}^{m} \xi_{ij} - \sum_{i=1}^{n} \sum_{j=1}^{m} q_{ij}] \le 0 \qquad\qquad (11) \\
\quad 0.9 p_{ij} \le x_{ij} \le 1.1 p_{ij}, \quad i = 1,2,\cdots,n; j = 1,2,\cdots,m. \quad (12)
\end{cases}
$$

where x_{ij} is the decision variable, ξ_{ij} is the fuzzy random variable, the form (10) and the form (11) express expected constraints, P_i and $\overline{P_i}$ are defined by (6) and (7), respectively, the form (12) expresses the limits of contractor's bidding unit price in order to avoid suspicion of unbalanced bidding according to many practical cases.

4.2 Maximax chance-constrained model

The second type of programming is fuzzy random chance-constrained programming (CCP), which was initialized by Liu (2001, p.713). Its outstanding feature characteristic is that the chance constraints should hold at least some given confidence levels. In fuzzy random unbalanced bidding problem, contractors may just want to obtain the optimization goals with fuzzy random constraints holding at least some given confidence levels. In this case, we assume that x_{ij} is the decision variable and ξ_{ij} is the fuzzy random variable for the same reason. In order to maximize the present value of the contractor's bidding price with some confidence levels subject to some chance constraints, we can establish the following maximax chance-constrained model based on fuzzy random CCP:

$$
\begin{cases}
\max\ \overline{f} \\
subject \quad to: \\
\quad Ch\{\sum_{i=1}^{n} k_i \overline{P_i} \ge \overline{f}\}(\gamma) \ge \delta \qquad\qquad (13) \\
\quad Ch\{\sum_{i=1}^{n} \overline{P_i} \le \sum_{i=1}^{n} P_i\}(\alpha_1) \ge \beta_1 \qquad\qquad (14) \\
\quad Ch\{\sum_{i=1}^{n} \sum_{j=1}^{m} \xi_{ij} \le \sum_{i=1}^{n} \sum_{j=1}^{m} q_{ij}\}(\alpha_2) \ge \beta_2 \qquad\qquad (15) \\
\quad 0.9 p_{ij} \le x_{ij} \le 1.1 p_{ij}, \quad i = 1,2,\cdots,n; j = 1,2,\cdots,m. \quad (16)
\end{cases}
$$

where $\gamma, \delta, \alpha_1, \beta_1, \alpha_2, \beta_2$ are the predetermined confidence levels, the form (14) and the form (15) express chance constraints, the other forms' meanings are similar to the analysis of the expected value maximization mode.

5. Hybrid intelligent algorithm

Generally speaking, it is difficult to solve uncertain programming models. In order to solve fuzzy random models, a hybrid intelligent algorithm integrating fuzzy random simulations, neural network and genetic algorithm was designed by Liu (2002). In this paper, we take the chance-constrained model as the example to introduce the hybrid intelligent algorithm.

Firstly, we apply fuzzy random simulations to estimate the uncertain functions with fuzzy random variables. The fuzzy random simulation is one of the most widely used techniques in fuzzy random system modeling, which has been applied in a wide variety of real problems. Although the fuzzy random simulation can't give the accurate results and it is also a time-consuming process, it is possibly the only effective method for complex problems.

In order to solve the model, we generate training input-output data for the uncertain function $U : x \rightarrow (U_1(x), U_2(x), U_3(x))$, where

$$U_1(x) = \max \left\{ \overline{\overline{f}} \left| Ch \left\{ \sum_{i=1}^{n} k_i \overline{P_i} \geq \overline{\overline{f}} \right\}(\gamma) \geq \delta \right\},$$

$$U_2(x) = Ch \left\{ \sum_{i=1}^{n} \overline{P_i} \leq \sum_{i=1}^{n} P_i \right\}(\alpha_1),$$

$$U_3(x) = Ch \left\{ \sum_{i=1}^{n} \sum_{j=1}^{m} \xi_{ij} \leq \sum_{i=1}^{n} \sum_{j=1}^{m} q_{ij} \right\}(\alpha_2),$$

by the fuzzy random simulation. Then we train a neural network to approximate the uncertain function U. Finally, the trained neural network is embedded into a genetic algorithm to produce a hybrid intelligent algorithm. The procedure can be summarized generally as follows:

Step 1. Generate training intput-output data for the above uncertain function U by the fuzzy random simulation and then train a neural network to approximate the uncertain function U.

Step 2. Initialize pop_size chromosomes whose feasibility may be checked by the trained neural work.

Step 3. Update the chromosomes by crossover and mutation operations.

Step 4. Calculate the objective values for all chromosomes by the trained neural network and compute the fitness of each chromosome according to the objective values.

Step 5. Select the chromosomes by spinning the roulette wheel according to the different fitness values.

Step 6. Repeat the third to fifth steps for a given number of cycles.

Step 7. Report the best chromosome as the optimal solution of the problem.

6. Numerical experiment

Here we will give an example to show the fuzzy random chance-constrained model that we have just discussed and how the hybrid intelligent algorithm works. Let us consider the following unbalanced bidding problem. Assume that the client's BOQ consists of five bidding activities and each activity has six components which are man-power cost, material cost, mechanical cost, administrative charge, profit, risk cost in turn. The unit prices of man-power cost and administrative charge remain unchanged, but others change during the period of total project according to some practical cases. The budget unit prices and engineering quantities of the client for activities are presented in Table 1 and Table 2, respectively. The monthly interest rate r is given as 1%.

In the bidding project, we assume that the bidding engineering quantities of each activity as fuzzy random variables, denoted by a form of triangular fuzzy variable $(\rho, \rho + a, r_3 + b)$, where a, b are given crisp numbers and ρ is a random variable with uniform distribution given in Table 3.

6.1 Maximax chance-constrained model

For example, the contractor decides to bid the project, in which the starting times and the duration times of activities are given in Table 4.

With the idea of maximizing the present value of contractor's bidding price for the total project at predetermined confidence levels subject to some chance constraints, we consider the following chance-constrained model:

$$
\begin{cases}
\max \overline{f} \\
subject \quad to: \\
\quad Ch \left\{ \sum_{i=1}^{3} k_i \overline{P_i} \geq \overline{f} \right\}(0.9) \geq 0.9 & (17) \\
\quad Ch \left\{ \sum_{i=1}^{3} \overline{P_i} \leq \sum_{i=1}^{3} P_i \right\}(0.9) \geq 0.9 & (18) \\
\quad Ch \left\{ \sum_{i=1}^{3} \sum_{j=1}^{5} \xi_{ij} \leq \sum_{i=1}^{3} \sum_{j=1}^{5} q_{ij} \right\}(0.9) \geq 0.9 & (19) \\
\quad 0.9 \, p_{ij} \leq x_{ij} \leq 1.1 \, p_{ij}, \quad i = 1,2,3; j = 1,2,3,4,5. & (20)
\end{cases}
$$

6.2 Model solution

We use Visual C++ software to realize the hybrid intelligent algorithm of fuzzy random maximax chance-constrained model with the following parameters: the pop_size is 30, the $p\_crossover$ is 0.3, the $p\_mutation$ is 0.2.

After a run of the hybrid intelligent algorithm (1000 cycles in simulation, 2000 training data in neural network, 600 generations in genetic algorithm), a quasi-optimal solution of the bidding project is presented in Table 5, whose objective value $\overline{f}$ =2780642.2.

The result shows that the present value of bidding price for the total project is 2780642.2 Yuan when the contractor uses the unbalanced bidding strategy with fuzzy random bidding engineering quantities. But the budget price for the total project is 3168000 Yuan when the owner adopts the method of linear programming. Then the present value of the budget price is 2742887.43 Yuan via conversion. In this way, the contractor can obtain surplus profit 37754.77 Yuan. The proof-test proves that this bidding strategy tallies with the actual situation completely. Therefore, the numerical result is persuasive and successful.

7. Conclusion

In this paper, we attempted to solve unbalanced bidding problem with mixed uncertainty of fuzziness and randomness. Fuzzy random variable was introduced and unbalanced bidding problem with fuzzy random bidding engineering quantities was dealt with. Two types of fuzzy random models, including the expected value maximization model and the maximax chance-constrained model were built to meet different optimization goals after some concepts of fuzzy random variable were recalled. Then hybrid intelligent algorithm integrating fuzzy random simulations, neural network and genetic algorithm was designed and a numerical example was given. From the numerical result, we could clearly see that the hybrid intelligent algorithm could effectively solve the fuzzy random unbalanced bidding problem. Furthermore, we could make the unbalanced bidding price more reasonable and applicable. In addition, this paper provided a good applied case for the practice of uncertain programming, and it also put forward a new approach for the promotion of uncertainty theory.

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Table 1. The budget unit price of the client (unit: RMB)

p_{ij}	1	2	3	4	5
1	60	55	70	80	35
2	60	120	110	80	30
3	60	160	80	80	20

Table 2. The budget engineering quantities of the client

q_{ij}	1	2	3	4	5
1	3000	5200	4000	1800	2000
2	4400	3700	4500	500	3900
3	4100	2000	2700	500	1300

Table 3. The bidding engineering quantities of the contractor

ξ_{ij}	1	2	3	4	5
1	$(\rho,\rho+150,\rho+300)$	$(\rho,\rho+250,\rho+450)$	$(\rho,\rho+200,\rho+350)$	$(\rho,\rho+150,\rho+300)$	$(\rho,\rho+100,\rho+200)$
2	$(\rho,\rho+150,\rho+350)$	$(\rho,\rho+150,\rho+300)$	$(\rho,\rho+300,\rho+500)$	$(\rho,\rho+20,\rho+50)$	$(\rho,\rho+150,\rho+300)$
3	$(\rho,\rho+200,\rho+400)$	$(\rho,\rho+100,\rho+250)$	$(\rho,\rho+100,\rho+180)$	$(\rho,\rho+25,\rho+45)$	$(\rho,\rho+60,\rho+120)$

Table 4. The starting times and the duration times of activities

the ith activity	t_{si}	$t_i (month)$
1	Jan. 2009	13
2	Oct.2009	11
3	Feb.2010	11

Table 5. The bidding unit price of the contractor   (unit: RMB)

x_{ij}	1	2	3	4	5
1	59.161	56.187	70.042	81.348	36.813
2	58.834	123.63	111.50	78.967	30.424
3	60.782	158.05	79.791	76.102	21.871

The Role of Presentation Format on Decision-makers' Behaviour

in Accounting

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Abstract

The recent increase in researching presentation format area is resulting by the increase in awareness on the importance of presentation format on decision-makers' behaviour. This paper presents a synthesis of prior research on presentation format in the accounting literature which could be used as bases and references for future research. It reviews and evaluates existing accounting literature that examines the linkages of presentation format on decision-makers' behaviour. Finally, future research opportunities in this area are made.

Keywords: Presentation format, Decision-makers, Decision-making

1. Introduction

Decision-making is a cognitive process that leads to the selection of a course of action among alternatives that produces a decision outcome (Libby, 1981; Cloyd, 1995). It involves three central stages: input; processing and output (Libby and Lewis, 1977). Since decision-making process involves reliance on the nature and content of information being inputted and how the information is being presented, there is a possibility that decision makers would not be able to obtain information due to human information processing limitations (Cloyd, 1995; Roberts, 2002). This view is supported in the psychological studies that suggested:

Humans are portrayed as intellectual cripples, limited in their capacity to think, and biased by cognitive processes that interfere with rational decision-making. They are oversensitive to variables that are not included in normative theories and under sensitive to variables that are. They become more variable when given more information and increase their confidence in the accuracy of their judgments when they should not (Ebbesen and Konecni, 1980, p 21)).

In general, there are few limitations related to cognitive information processing. First, decision-makers mentally acquire knowledge of similar or related information items or situations and tend to overlook information that is placed out of the normal situation (Chi et al., 1981; Hirst and Hopkins, 1998; Maines and McDaniel, 2000; Hodge et al. 2004)). Decision-makers tend to assume that a particular interest or practice is being treated similarly at all times. For example, Hirst and Hopkins (1998) found that a fundamental variation in the way accounting information is presented can have a predictable impact on analysts' stock price estimates. They found that analysts only include an information item in their valuation when it is placed in a normal situation unless they had acquired it through accidental discovery.

Secondly, studies have found that decision-makers can be influenced by the placement of information (Hopkins, 1996; Hirst and Hopkins, 1998; Maines and McDaniel, 2000; Libby et al., 2002; Hodge and Pronk., 2006). These studies suggest that decision-makers rely on a "placement signal" – the placement of information to determine whether the information item should be included in their valuation. Some studies provide evidence that placement signal affects both non-professional decision-makers (Maines and McDaniel, 2000) and professional decision-makers (Hirst and Hopkins, 1998).

Thirdly, studies have shown that decision-makers generally incur different degrees of cognitive costs in situations where they are required to select an alternative from similar functions (Russo, 1977; Fischoff et al., 1978; Nisbett et al., 1981; Hackenbrack, 1992; Hoffman and Patton, 1997; Shelton, 1999). For example, Hodge et al. (2004) found that participants take longer time to complete an investment decision task when they are given two firms that have adopted different accounting models. This is because they need to place the two firms on par before making investment decisions.

Fourthly, search behaviour could also affect how decision-makers process information (Bouwman, 1982; Bouwman et al., 1995; Hunton and McEwen, 1997; Maines and McDaniel, 2000; Hodge et al., 2004). These studies suggest that professional decision-makers practice directive search, in which they search directly for a specific information item in the financial statement, regardless of the location of the information item. On the other hand, non-professional decision-makers often practice sequential search, in which they tend to search through all available information in a relatively sequential manner. However, as they gain more experience in the decision environment, they progressively develop more sophisticated information search strategies and become more directive in their search patterns (Yates, 1990).

Finally, decision-makers are also influenced by the classification of an information item (Petroni and Wahlen, 1995; Lipe, 1998; Hirst and Hopkins, 1998; Dhaliwal et al., 1999; Maines and McDaniel, 2000). They tend to provide more weight to an information item that they believe is the main or core activity compared to an item which is not related to core activity. For example, Hirst and Hopkins (1998) demonstrated that analysts often fail to acquire unrealised gain and loss information for marketable securities of an electronic manufacturing firm when this information is presented in the balance sheet. However, they do acquire and use this information when it is presented in the income statement. In contrast, Petroni and Wahlen (1995) and Maines and McDaniel's (2000) studies found that professionals acquire such information in the balance sheet when valuing a financial services firm.

Once the limits of human information processing were established, researchers then explored ways to overcome these limitations. There are now many ways available to assist decision-making (Libby, 1981; Libby and Lewis, 1982; Libby et al., 2002). However, before determining which way is the best, there is a need to identify the source of deficiency in decision-making (Bonner, 1999). The source of deficiency can be caused by two main sources: the decision maker or the task. If the deficiency is caused by the decision maker, proper training may be beneficial to instil skills and knowledge in performing the task (Roberts, 2002). If the source of deficiency is the task, then changing the structure of the task may alleviate some of the problem.

One potential solution that addresses the limitations of human information processing and improves decision-making is the use of presentation format. The following section presents the relevance of presentation format to decision-makers. Section 3 presents a review and evaluation of the effect of presentation format on decision-makers behaviour. Section 4 presents the view of reliance on presentation format. Section 5 provides the theories used in the presentation format literature. In the final section, future research directions are provided.

2. Relevance of presentation format

Numerous studies have suggested the use of presentation format to minimise human information processing limitations (Chervany and Dickson, 1974; DeSanctis and Jarvenpaa, 1989; Davis et al., 1989; Iselin, 1989; Hard and Vanecek, 1991; Stone and Schkade, 1991; Frownfelter-Lohrke, 1998; Stocks and Tuttle, 1998; Dull et al., 2003). These studies

suggest that presentation format could overcome the effect of increased information (Roberts, 2002) and also improve ways of thinking (Schick et al., 1990). Moreover, the use of presentation format could also assist decision-makers to be aware of non-eminent information (Hodge et al., 2004).

Presentation format has been used to support decision-making processes and help decision-makers overcome human information processing limitations (Libby and Lewis, 1982; Maines, 1995; Brown and Eining, 1996; Hodge, 2001; Hodge et al., 2004). It could assist decision-makers in processing a large quantity of data and reduces cognitive effort (Brown and Eining, 1996; Rose, 2002). Presentation format studies are based on cognitive science literature which contributes to the understanding of the decision process (Libby and Lewis, 1982; Dillard, 1984). The evolvement and the use of presentation format is particularly encouraging although research relating to decision-makers' behaviour from an accounting perspective has not been extensively explored (Maines, 1995; Hopwood, 1996; Debreceny and Gray, 2001; Wu and Vasarhelyi, 2004).

Early accounting behavioural studies tended to disregard investigating presentation format as researchers were more focused on examining the accounting content of financial information and ignored the examination of the way information is presented to users (Hopwood, 1996). The lack of early studies on presentation format could be attributed to normative theories of choice that suggest a decision should not change just because the way a problem is described has a minor variation (Maines, 1995). That is, the way information is presented should not affect the way decision-makers process the information since decision success is dependent on decision-makers' cognitive processes. Yet, Libby and Lewis (1982) argue that failure of this principle to hold across different representations of the same problem still exists. This is consistent with Slovic et al. (1990) who suggest that judgment and choices are actively constructed. If decision-makers' reported preferences are constructed in response to a specific task, then they would be susceptible to influence by the idiosyncrasies of a presentation format.

Although the literature has focused primarily on information content, some studies have examined the importance of presentation format and its linkages to decision-making performance. The growing number of studies examining presentation format provide an indication of the importance of presentation format on decision-making (Vessey and Galletta, 1991; Ramarapu et al., 1997; Frownfelter-Lohrke, 1998; Dull and Tegarden, 1999; Hodge, 2001; Dull et al., 2003; Hodge et al., 2004; Hodge and Pronk, 2006).

The resurgence of presentation format studies in the accounting context derives from: (i) the progression of annual reports from the traditional hard copy to digital reporting environment (Dull et al., 2003); (ii) theories combining psychology and economics that   allowed researchers to specify more clearly the mechanisms affecting decision-makers' behaviour (Libby et al., 2002); (iii) the demand for further research in order to provide a theory of how different presentation formats affect decision-making performance (Maines, 1995); and, (iv) the increasing demand of various users' information needs, which has motivated the research on the effectiveness of presentation format as a tool of disseminating financial information (Smith, 2003).

3. The effect of presentation format on decision-makers' behaviour

Presentation format may influence decision-making, with both positive and negative consequences. It may affect decision-makers' behaviour in many ways such as search behaviour, affective responses, decision accuracy, cognitive effort, functional fixation and satisfaction, persuasion and recall. This section discusses the primary findings from the presentation format literature and their impact on the decision-makers' behaviour. Figure 1 presents an overview that shows the effect of presentation format on decision-makers' behaviour.

<INSERT FIGURE 1 ABOUT HERE>

3.1 Search behaviour

Search behaviour refers to how decision-makers acquire information (Hunton and McEwen, 1997)). Search behaviour is often assessed by the way decision-makers acquire information (Bouwman et al., 1987; Hunton and McEwen, 1997) and the amount of information acquired (Painton and Gentry, 1985). Several studies have examined presentation format effect on search behaviour (e.g Watson and Driver, 1983; Painton and Gentry, 1985; Bouwman et al., 1987; Purvis, 1989). These studies generally used a similar methodology which involved using various types of presentation formats with students as their participants. The results show that presentation format affects decision-makers' search behaviour by influencing the amount of information acquired and the manner in which the information is acquired.

Another body of literature used presentation format as an instrument to examine decision-makers' search behaviour (Bouwman et al., 1987; Hunton and McEwen, 1997; Nouri and Douglas-Clinton, 2006). This group of studies generally found that search behaviour differs between professional decision-makers and non-professional decision-makers. This is attributed to their different skills and knowledge (Hirst and Hopkins, 1998). Both professional and non-professional decision-makers tend to follow specific approaches (Vera-Munoz et al., 2002). Professional decision-makers use a direct search method, in which they move from one page to another in the financial statements to search and collect related information (Bouwman et al., 1987). Non-professional decision-makers use a sequential search method, in

which they read the reports in the order reported (Bouwman, 1982). These studies found that the direct search method results in more accurate answers to computational questions and greater consensus in the credit decision (Klammer and Reed, 1990 and the investment decision (Dull et al., 2003; Hodge et al., 2004).

Consequently, each type of search behaviour has negative implications (Hirst and Hopkins (1998); Hodge et al., 2004). Although directive search potentially reduces decision-makers' cognitive effort, such behaviour may cause them to ignore a related information item appearing in other parts of a corporate report (Hirst and Hopkins, 1998). For example, Hirst and Hopkins (1998) found that their analysts appeared to ignore information they believed *ex ante* would not provide important information. On the other hand, decision-makers adopting sequential search may incur higher cognitive effort. Such behaviour would lead them to reach cognitive overload and most likely discount an information item that is placed at the end of a financial report (Hodge et al., 2004).

3.2 Affective responses

Affective response refers to the change in the participant's mood or decision after being influence from certain objects (Rose, 2002). Affective response is assessed by providing participants with a few types of presentation formats or scenarios and then observing the change in their mood or decision. In general, presentation format studies suggest that presentation format affects affective responses (Martin et al., 1993; Kida and Smith, 1995; Hirt et al., 1997; Kida et al., 1998; Rose, 2002). For example, Martin et al. (1993) exposed their participants to movie clips to induce a happy or sad mood prior to completion of a task. They found multimedia presentations significantly altered subjects' moods in the expected direction. Similar results were found by Hirt et al. (1997) where decision-makers who were exposed to a presentation prior to task completion became happier or sadder, and this emotional state affected their strategies or effort in completing the task.

Kida and Smith's (1995) study suggests that affective responses to the presentation of information could help construct and combine memory traces. Ultimate decisions are framed according to the recall of affective responses, and comparisons between decision alternatives may often be made between differences in the recall of affective responses rather than accurately recalled information (Rose, 2002). Kida et al. (1998) found that participants made their decisions largely on affective responses to the presentation format. In the investment decision context, decision-makers tend to base decisions on their affective responses upon relying on the presentation format, and their resulting decisions favour investments that are associated with a positive response (Rose, 2002).

The finding that presentation format has an effect on affective responses could be attributed to the presentation format peripheral cues which influence memory patterns and investment decisions (Rose, 2002), as well as information related to other persons involved in the decision scenario (Kida et al., 2001).

3.3 Decision accuracy

Decision accuracy refers to the ability of a strategy to produce an accurate outcome (Ashton, 1991). Decision accuracy is often measured by comparing the outcome of the criterion with a benchmark (Frownfelter-Lohrke, 1998). Presentation format studies often focus on decision accuracy because one of the major concerns in users' performance is whether an appropriate decision could be made.

One body of literature suggests that the use of an appropriate presentation format increases decision accuracy (Stock and Watson, 1984; Dickson et al., 1986; Iselin, 1988; Vessey, 1991; Mackay and Villareal, 1987; Hard and Vanecek, 1991; Stone and Schkade, 1991; Anderson and Kaplan, 1992; Ramarapu et al., 1997; Frownfelter-Lohrke, 1998; Almer et al., 2003; Hodge et al., 2004; Ghani et al., 2007). Another body of literature suggests that presentation format does not affect decision accuracy regardless of whether the decision-makers rely on an appropriate presentation format (Bricker and Nehmer, 1995; Dull et al., 2003; So and Smith, 2003).

The link of a dependent relationship between decision accuracy and presentation format is affected by factors such as matching of the presentation format and task (Vessey, 1991; Umanath and Vessey, 1994), and the idiosyncrasies of the presentation format (Moriarity, 1979; Hard and Vanecek, 1991; Frownfelter-Lohrke, 1998). However, some studies suggest that the degree of information processing is the determinant of decision accuracy (Bricker and Nehmer, 1995; So and Smith, 2003). Degree of information processing refers to the amount of relevant information that decision-makers access or refer to before arriving at a decision outcome (Cloyd, 1995). It is argued that if a higher degree of relevant information is processed it should lead to higher decision accuracy (Beach and Mitchell, 1978; Payne, 1982; Davis, 1989). For example, Bricker and Nehmer (1995) suggest that presentation format is not the main contributor to decision accuracy. They argue that the contributor is the degree of information processing. However, their findings are debatable as a higher degree of information processing could indicate a reliance on an inappropriate presentation format (Vessey, 1991; Vessey, 1994), and consequently lead to information overload (Benbasat and Schroeder, 1977).

3.4 Cognitive effort

Cognitive effort refers to the total expenditure of cognitive resources required to complete a task (Frownfelter-Lohrke, 1998)). Cognitive effort is often measured by total decision time or total number of cognitive operations (Kleimuntz and Schkade, 1993; Ramarapu et al., 1997; Dull et al., 2003). Presentation format studies focus on cognitive effort because decision-makers tend to find ways to reduce their cognitive effort (Beach and Mitchell, 1978)). They often rely on perceptual, i.e., perceived, processes which consume less time (Coury and Bouletter, 1992; Vessey, 1994). Coury and Bouletter (1992) found that decision-makers tend to rely on any perceptual cues that are available in the data when time is a constraint.

In general, studies have found that presentation format does influence cognitive effort (Schwartz and Howell, 1985; Benbasat and Dexter, 1985; Jarvenpaa, 1989; Stone and Schkade, 1991; Coury and Bouletter, 1992; Bricker and Nehmer, 1995; Tuttle and Kershaw, 1998). However, other studies have found that presentation format does not affect cognitive effort (Benbasat and Dexter, 1985; Dickson et al., 1986; Jarvenpaa, 1989; Dull et al., 2003; Ghani et al., 2007). For example, Dull et al. (2003) examined the effect of different presentation formats (hyperlinked versus non-hyperlinked) on decision-makers' judgments in terms of decisions, predictions, and the amount of information accessed. The researchers also examined the amount of time participants took to make decisions. In relation to the time taken, Dull et al. (2003) found a significant difference in the impact of the presentation format on time used, although the effect was only demonstrable for participants assessing small firms. They found no significant difference for those participants assessing large firms.

A review of the literature supports the alternative body of work. For example, Benbasat and Dexter (1985) examine the influence of differential presentation formats on decision-making performance. They found a tabular format leads to faster decision-making compared to a graphical format, but graphical formats outperformed tabular when time constraint was low. Tuttle and Kershaw (1998) found that using a tabular format increases speed compared to a graphical format, but in Bricker and Nehmer (1995) graphical formats outperformed tabular.

3.5 Functional Fixation

Presentation format studies have examined the effect of presentation format on functional fixation (Hodge et al., 2002 ; 2004; Ghani et al., 2007; 2008). Functional fixation refers to a person attaches a meaning to a title or an object and is unable to see the alternative meanings or uses. Functional fixation exists when decision-makers fail to adjust for differences arising from the adoption of different accounting methods (Libby et al., 2002). Most of the studies found the existence of functional fixation in situations where firms are given alternatives in placing an information item in the financial statement (that is recognised in the body of the financial statement or alternatively disclosed in the notes to the accounts).

Recent studies propose potential solutions to alleviate the effect of functional fixation in recognition versus disclosure situations. These studies use external and internal inputs such as presentation format and learning to alleviate functional fixation in decision-makers' cognitive processing (Luft and Shields, 2001; Hodge et al., 2002; 2004; Ghani et al., 2008). Results of the studies on functional fixation in the presentation format literature are mixed. Hodge et al. (2002; 2004) found presentation format to be a potential solution for functional fixation. On the other hand, a study by Ghani et al. (2008) failed to provide evidence that presentation format could alleviate functional fixation in an investment decision task.

3.6 Satisfaction, persuasion and recall

Presentation format studies have examined the effect of presentation format on satisfaction, persuasion and recall (Umanath et al., 1988; Ottinger, 1993; Butler and Mautz, 1996; Hopwood, 1996; Clements and Wolfe, 1998; 2000). Satisfaction is measured by the level of fulfilment upon relying on the presentation format (Ottinger, 1993). Persuasion is measured by a change of attitude toward an object (Clements and Wolfe, 1998). Recall is measured by users' ability to remember what has been viewed during the presentation (Metcalfe et al., 1981). These variables were examined because users' acceptance of an object could be influenced by the level of satisfaction, the degree of influence and the ability of the object to improve recall (Metcalfe et al., 1981).

In general, these studies found features of presentation formats could influence the level of viewer satisfaction (Ottinger, 1993; Butler and Mautz, 199). Ottinger (1993), who examined satisfaction among participants on two presentation formats, found participants viewing multimedia kiosk presentations were significantly more satisfied than subjects who viewed a printed brochure. Similar results were found in Butler and Mautz (1996) and Clements and Wolfe (1998). These studies implied that users' satisfaction depends highly on presentation format, particularly the ability to entertain users.

Studies have also found that presentation format could influence persuasion (Ottinger, 1993; Hopwood, 1996; Clements and Wolfe, 2000). For example, Ottinger (1993) found a multimedia kiosk presentation format had a more positive effect on attitude change as opposed to a printed brochure. Similar results appeared in Clements and Wolfe's (2000)

study. However, Clements and Wolfe (1998) did not find any significant difference in persuasion between multimedia presentation format and printed presentation format.

Similarly, studies have found that presentation format affects recall (Metcalfe et al., 1981; Umanath et al., 1990; Clements and Wolfe, 1998; Umanath et al., 1998; Hodge et al., 2004; Nouri and Douglas Clinton, 2006). The results of such studies are consistent. Presentation format has different effects on recall. For example, Umanath and Scarnell (1998) found graphical presentation enhances recall when the task possesses a spatial format.   Similarly, Clements and Wolfe (1998) found a hardcopy presentation format gave greater recall to participants, although they found multimedia more entertaining.

In summary, the presentation format literature has examined decision-makers' behaviour in many ways. An observation of the studies suggests that the features of presentation format play a role in influencing decision-makers' behaviour. Another observation is that the effect of presentation format also depends on the tasks to be performed and the decision-makers' characteristics, such as working experience. However, the effect of presentation format on decision-makers' behaviour can only be materialised provided that the presentation format is relied upon.

4.   Reliance on presentation format

Even though a technology may have a higher capability to assist decision-makers in their tasks, there is a tendency for decision-makers to avoid relying on the technology (such as presentation format) (Rose, 2002). An increase in the reliance on a presentation format generally could lead to an improvement in decision-making provided all relevant information is included (Robert, 2002). The information system literature has identified few factors that affect reliance (Rose, 2002). For example, familiarity with a technology would encourage reliance on it (Brown and Eining, 1996; Whitecotton and Butler, 1998). Decision framing does not affect reliance (Brown and Jones, 1998). Decision-makers' confidence with the technology may also influence reliance (Arnold and Sutton, 1997).   One possible factor that affects reliance on a technology is decision-makers' perceptions, as negative perceptions are likely to affect reliance on the technology (Davis, 1989).

Several studies have investigated whether work experience affects reliance on a technology. The results are mixed. A few studies found that work experience affects reliance on a technology. Others do not. For example, Whitecotton (1996) studied the effect of working experience on reliance on a technology and found experience to have no effect. Other studies found more experienced decision-makers would use and rely on a technology compared to less experienced decision-makers (Kachelmeier and Messier, 1990; Abdolmohammadi, 1992). Arkes et al. (1986) found that experienced users performed worse than moderate knowledge users when relying on a presentation format.

Another body of literature suggests that familiarity with a technology also affects users' reliance on it. Mackay and Elam (1992) and Mackay et al. (1992) suggest that a high level of working experience results in better performance when accompanied by a high level of familiarity with the technology. Arkes et al.'s (1986) study found a contrasting result. They found that participants with more knowledge but less familiarity with a technology performed worse when relying on the technology than participants with a moderate level of knowledge. This is consistent with the behavioural decision literature which suggests that the performance of users with a higher level knowledge will be obstructed when relying on a technology which they are not familiar with. For those users with a moderate level of knowledge, the unfamiliarity of using a particular technology would not be affected since they would still need to go through a more detailed process compared to the professional users (Vera-Munoz et al., 2002).

The different results of these studies could be attributed to the different type of decision tasks in each study. These studies found that the type of decision task is one of the factors that is likely to have an effect on the use of a technology such as presentation format. Such studies are hampered by the lack of a usable taxanomy of decision task types and their characteristics. Secondly, the subjects used in these studies often differ in terms of knowledge and experience.

5. Theories offered in the presentation format literature

5.1 Bertin's Theory

Bertin's theory (1983) is a theory introduced in the presentation format literature concerning different forms of presentation formats. The theory relates to the process of obtaining information cues from a presentation format in order to answer questions, and focuses on determining the most appropriate presentation format for a given question.

According to Bertin, performance with a presentation format is a function of three factors: (i) the information set presented; (ii) the question to be answered; and, (iii) the presentation format. Bertin's theory also theorised that the most appropriate presentation format for a particular question is the one that minimises cognitive effort. Different forms of presentation make some aspects of the information displayed more apparent, and questions of different levels of complexity pertain to different characteristics or relationships within the information. Therefore, in sum, one presentation format cannot be said as a technology to generally solve an issue; rather certain presentation formats that can be used to achieve low cognitive effort in a specific task, may not be effective in a different task.

5.2 Cognitive Fit Theory

Vessey's (1991) cognitive fit theory is introduced in the "Graphical versus Tabular" literature which also supports the concept that the format of the information presented to decision-makers affects the outcome of their decisions. The cognitive fit model suggests that there are different types of problems, processes to solve the problems, and representations of the problems. If these three variables fit, then the model holds that decision quality should improve (Vessey, 1991). The transfer of financial information to a new form of presentation format could provide a better "fit" between financial information and its users

Cognitive fit theory states that humans are limited processors and therefore a more effective problem solving could result when the complexity in the task environment is reduced. Vessey (1991) proposes that mismatches between information format and the information-processing requirements of the task cause task complexity to increase, resulting in more difficult tasks. This theory theorised that the failure to match the presentation format to the task involved leads to the ineffective processing of information. Therefore, in sum, decision-making performance could only be achieved only when the presentation format fits the task to be performed.

5.3 Cost-Benefit Theory

Cost-benefit theory explains decision makers' choice among strategies in terms of cognitive trade-off between efforts required to employ the strategy and the accuracy of the resulting decision (Beach and Mitchell, 1978; Payne, 1982; Davis, 1989). Cost-benefit theory has been applied extensively to choice tasks. In presentation format literature, Cost-benefit theory implies that presentation format define a "cognitive incentive system" for decision makers because presentation format is one of the task variables that influence strategy change. Since both effort and accuracy associated with strategy may vary with changes in choice tasks, different strategies will provide the best trade-off in different situations.

Two cost-benefit dimensions related to decision makers' cognitive processing are (i) the cognitive effort required to use a strategy and (ii) the ability of a strategy to produce an accurate outcome (Kleinmuntz and Schkade, 1993). Effort reflects total expenditure of cognitive resources required to complete a task such as completion time. Accuracy measures compare the outcome of a criterion. These two dimensions were further categorized into two measures. The two measures are (i) objective measures for both effort and accuracy and (ii) subjective measures for both effort and accuracy (Kleinmuntz and Schkade, 1993). These measures have been used by a number of studies in the presentation format literature (e.g, Frownfelter-Lohrke, 1998; Ghani et al, 2007).

5.4 Dual Coding Theory

Paivo's (1986) Dual Coding theory is introduced in attempt to give equal weight to verbal and non-verbal processing. He states "Human cognition is unique in that it has become specialized for dealing simultaneously with language and with non-verbal objects and events. He further postulated that images were more likely to be evoked by pictures than words and with concrete rather than with abstract words. Mayer and Anderson (1991) supported this theory by exposing users to visual and verbal explanation simultaneously was more effective in promoting creative problem solving than by giving separate verbal and visual explanation.

The theory assumes that there are two cognitive subsystems, one specialized for the representation and processing of non-verbal objects or events (imagery) and the other specialized for dealing with language. Dual Coding theory identifies three types of processing: (i) representational, the direct activation of verbal or non-verbal representation, (ii) referential, the activation of the verbal system by the non-verbal system and vice versa and (iii) associating processing, the activation of representations within the same verbal or non-verbal system. A given task may require any or all of the three kinds of processing.

In accounting, Clements and Wolfe (1997; 2001) used this theory by analyzing the effect of multimedia on satisfaction, persuasion and recall. Their studies involved experimental design where subjects were entertained by the multimedia annual report and hard copy annual report and found that subjects were equally persuaded by both annual report formats but had significantly greater recall with the paper based annual report than with the multimedia annual report. In other words, subjects with strong verbal subsystem who received a paper based report recall more than multimedia report users regardless of presentation preference.

5.5 Proximity Compatibility Theory

This theory suggests set of guidelines on which to base a visual display design. It is a series of studies concerning the appropriateness of graphical display, task type, and the integration of dimensions. In this view, an optimal display should be both physically and perceptually proximate and compatible. Proximity is defined in terms of sharing of features between displayed attributes such as closeness in space, identity in colour or similarity of semantic meaning (Carswell and Wickens, 1987).

Not many studies have applied this theory in the presentation format and accounting literature, mainly because it focuses more on computerized information processing. Dull and Tegarden (1999) investigates the relationship between three visual representations (two dimensional, three dimensional fixed and three dimensional rotatable) and subjects' ability to make predictions based on the data. Amer (1991) examines the effect of varied types of decision task and displays of multi-cue financial information on decision making performance and user perceptions about display due.

6. Future research opportunities

Presentation format literature is particularly importance and relevance to accounting. In particularly, as new technologies available to present financial information are emerging, there is a need to refocus researching from examining information content to the way information is being presented in the accounting paradigm. This is consistent to the notation by Dull et al. (2003, p 185), "while much research has been conducted concerning accounting content of financial statements, limited research has been conducted in the area of presentation. One reason the research has been limited is because many of the technologies currently available to present financial statements were not available until recently".

Few research opportunities in the area of presentation format could be identified to enhance and evolve the presentation format literature in the accounting paradigm. Firstly, Ghani et al. (2007) have provided preliminary evidence that presentation format affects effectiveness but no evidence that presentation format affects efficiency. Perhaps more research could be conducted to examine the impact of presentation format on the efficiency and effectiveness of decision-makers' decision quality in order to provide empirical evidence on the effect of presentation format on decision quality. The need of such research has also been identified by other academics such as Abdolmohammadi et al. (2002) and Debreceny and Gray (2001). Examining such an issue would also address the limitations in previous studies which have focused on the smaller scale presentation format (such as tabular and graphical) that represents only a small section of the financial report.

Studies in the information system literature have suggested that the success of a technology (such as presentation format) is likely to depend on internal factors (such as perception), which is a primary input to decision-making (Beach and Mitchell, 1978; Abelson and Levi, 1985; Davis, 1989; Adams et al., 1992). These studies propose that users often share similar views on the usefulness and ease of use of technologies that have a similar function and that acceptance of a technology is highly dependent on their perceptions of that technology (Adams et al., 1992; Beach and Mitchell, 1978; Davis, 1989).

In accounting and presentation format literatures, perception has not been extensively explored. Ghani et al. (2007) attempted to examine this issue using instrument created by Davis (1989) used to measure perceived usefulness and ease of use and found similar results to the ones in the information systems literature. They also found some evidence that these perceptions may not necessary be similar to their actual performance. Apart from Ghani et al.'s study, there is limited research to support their findings in the presentation format literature. Exploring this area would enhance the understanding of users' perceptions of presentation formats.

Thirdly, Ghani et al. (2007; 2008) examined whether presentation format would be able to alleviate functional fixation caused by recognition versus disclosure. Using experimental design on public accountants in the context of a less eminent item (Accounting for investment property), their study could not provide evidence that presentation format could alleviate functional fixation in an investment decision task. Their results are in contrast to Hodge et al. (2002; 2004) in which Hodge et al. used experiment design using students as proxy in a more debated item (Stock option compensation). Further research could be conducted to provide a conclusive evidence on the role of presentation format in alleviating functional fixation since this issue raises the interesting question of whether similar results would emerge in different settings.

Finally, most of the studies in the presentation format literature used a homogenous group and further, students were used as proxy to actual decision-makers in their experimental settings. Additionally, given the heterogeneity in decision-makers, the use of any one group (such as public accountants) may limit the ability to generalise the results to other decision-makers. Because of the different constraints (time and monetary), incentives and decision contexts experienced by various decision-makers, using other types of decision makers may assist in enhancing the understanding of other decision makers such as the financial analysts and investment brokers.

In summary, there are a lot of opportunities in researching the area of presentation format in the accounting paradigm. The fact that limited research has been conducted in this area provides an indication that it is important to continue working on this area in order to enhance our understanding.

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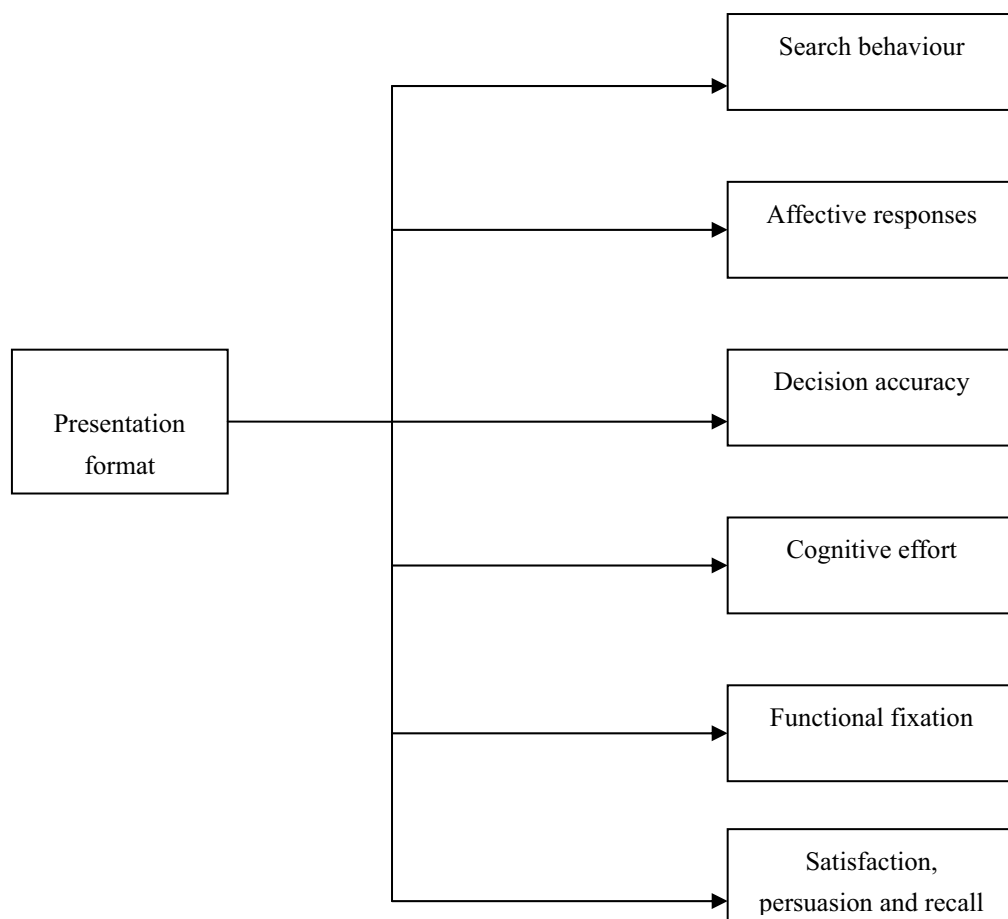Yates, F. J. (1990). Judgment and decision making, Englewood Cliffs, NJ: Prentice Hall.

Figure 1. The effect of presentation format on decision-makers' behaviour

Using Internet Data Collection in Marketing Research

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Abstract

With fast growth, internet has been used almost everywhere. For marketing research, internet's bi-directional, multimedia characteristics make marketing research more easily and efficient. In this paper, data collection in marketing research is discussed. It focuses on the application of internet in data collection. The strength and weakness are also mentioned.

Keywords: Internet, Online survey, Data collection, Marketing research

1. Introduction

1.1 Marketing Research

To be successful in the fiercer and fiercer competitive market, precise marketing researches are the basic and critical element. Formal studies of specific problems and opportunities are necessary for a marketer. Marketing research can help to realize these by market survey, product-preference test, sales forecast, and advertising evaluation, etc. Philip Kotler (2000) defined marketing research as "the systematic design, collection analysis, and reporting of data and findings relevant to a specific marketing situation facing the company."

1.2. Data Collection

Data collection is an elementary step in marketing research. Sampled data are collected through various means that provide a basis for analyzing the market behavior of a general population. Traditional methods for data collection include data recording and survey. Data recording refers to the process of collecting market-related data over time, such as sales data, advertising expenditure, customer information, etc. Usually, these data are collected for business purposes and are stored in the company's central database. A survey usually consists of three basic elements: target audiences (the group of selected people from the population), communication methods such as mail, fax, telephone, and person-to-person interviews, and survey content that contains a set of carefully-designed questions. Analyzing market data is crucial for understanding a consumer's buying habits and forecasting future market outcomes, and, accordingly, in assisting marketing decision-making.

2. Internet Data Collection

The growth of internet has revolutionized a lot of business and consumer behavior (Harter, 1999). One of the consequences is that it has been used as an alternative research tool for market research. Using of internet has made it less costly and more quickly and easily to get information than ever before. Internet also allows more detailed information to be collected than traditional surveys.

2.1 Different Forms of Internet Surveys

Internet survey can be done in different ways. In Comparing several forms of online surveying, MacElroy (1999) describes some of the common forms of online research being used for commercial applications, ranging from the most basic through highly sophisticated forms.

E-mail

The text-based e-mail survey is the most basic online research form. E-mail surveys are very like traditional mail surveys, the whole survey is sent to the audience, and can be seen by the respondent at once and respondents can change their answers at any time during the survey. The only difference is the way to transmit the survey. There is no need of special software and too much high technique, so it is considered as the least costly and simplest method. But at the same time, this simplicity leads to "boring" feeling when people complete the survey. Generally speaking, the ideal use of e-mail form is for internal corporate surveys because these audiences tend to follow instructions better than external

audiences (MacElroy 1999).

Bulletin boards

Bulletin board researches are useful for a "modified Delphi method" for collecting responses over time (MacElroy 1999). Similar to a focus group, the researcher invites a group of respondents to a specific Web site, of a physically existed meeting room, where a discussion topic is posted. People can respond to the question(s) and express their opinions based on others' comments.

The cost of bulletin boards is also cheap, but somewhat higher than e-mail surveys because handling the comment transcripts and code responses is very time-consuming. The rich data it provides and relatively rapid reactions are its biggest advantages.

Web HTML

The HTML form-based surveys allow the respondent to click buttons and boxes, to fill in text boxes, and eventually to submit the information all at once. The colorful design such as graphics, audio, video, and animation make the whole survey process more interesting and attractive. Nowadays, it is the most common form of on-line survey, accounting for almost 80 percent of all survey data being collected on-line (MacElroy 1999).

Web fixed-form interactive authoring tools

Another new form of on-line research is survey authoring tools, which have been developed from previous generations of software used to conduct computer-assisted telephone interviews (CATI) or disk-by-mail (DBM) studies (MacElroy 1999). This technique allows the individual researcher to construct highly sophisticated studies for the on-line environment. However, these tools typically limit the range of options in which the survey can be displayed. Some software packages may limit the number of questions can be displayed on the Web page, while others may limit the design flexibility. The researcher has to choose between these two alternatives. Another disadvantage of this technique is that most of these tools usually cannot allow the researcher to control the whole research process (lack of self-hosting options). The cost for self-hosting is quite high (in the range of $30,000 to $60,000) if the researcher wants to host the survey they have created on their own internal servers (McElroy 1999).

Web customized interactive programming

The most powerful and flexible, yet the most expensive online surveying option is custom programmed surveys. Custom programming not only provides all of the modern technical controls such as screening, skip-patterns, and error checking, but also offers many other functions that allow the researcher the highest level of flexibility.

The key benefit of this technique is its flexibility in layout. Unlike fixed-form tools, this type of online survey enables the researcher flexibly chooses many different design options such as question/response styles, backgrounds, and graphics. In addition, it provides much extended functionality such as running a live Web site for evaluation within the survey frames, and running procedures such as file downloads during the survey (McElroy 1999). However, compared to fixed-form tools, custom designed surveys take longer to program and can be more costly.

Downloadable surveys

Another on-line research method is surveys that are downloaded from the Web and run on previously installed software provided by the researcher (MacElroy 1999). This technique shifts the computing tasks from the on-line server to the respondent's PC. Once the survey has downloaded on the respondent's PC, a data file is created which can then be opened the next time the Internet is accessed.

As an alternative, completely custom-programmed surveys can be used for single-use surveys. Of all the research options mentioned here, this technique allows the researcher to have the most control and flexibility. Because this type of survey requires respondents have certain level computer knowledge in order to install software and correctly handle the data upload process, this form of online research tend to be more costly and time-intensive than other forms. Typically, this technique is often used with panels or pre-recruited groups who regularly communicate with the survey organizer (MacElroy 1999).

Web Moderated Interviewing: Chat Interviews and Other Discussion Formats

The last form of online research is the qualitative, real-time chat interviews. Although some people refer to this technique as on-line focus groups, MacElroy(1999) draws a few distinctions between these two methods. While people in traditional focus groups are highly influenced by the moderator's skill, in chat interviews, however, the logic and control mechanisms are supplied by a highly skilled human moderator. Just as the traditional moderator must control the overly enthusiastic participant, the on-line moderator must control the "tyranny of the fastest typist" (MacElroy 1999). The key benefit of chat interview is its flexibility. Respondents from different geographical regions can be brought together quickly and efficiently to participate discussion.

2.2 The Comparison of Internet Data Collection with Traditional Method

Comparing with other approaches, internet-based data collection methods are claimed: lower costs; faster turnaround; broader stimuli potential; and greater enjoyment (Forrest, 1999; Kehoe and Pitkow, 1996). In contrast, traditional marketing research is suffering from falling participation rate, rising costs, respondent fears concerning misuse of personal information and managerial issues resulting from the time taken to conduct postal surveys (Jarvis, 2002). But it also shows several disadvantages of internet survey such as sampling difficulties, the problems of response rates and quality.

2.2.1 Lower Costs

The cost of sending e-mail or setting up a Web questionnaire is much cheaper than other equivalents. In traditional research, the need for printing, stuffing, two-way postage, calling-expenses (especially, long-distance calls), data entry, handling and tracking, etc costs a lot of money for a survey. Using of internet survey can reduce or remove much of these burdens. Once a questionnaire is completed, the data are already in electronic form and can be downloaded immediately into a database for complex analysis (Lyer, 1996). In effect, once the last questionnaire for a survey is complete, researchers have all the data stored in a database at their fingertips instantaneously. If specific software doesn't need continually developing, the cost of internet-based survey is much lower than others. Weible and Wallace (1998) estimated that the variable cost of sending a questionnaire (via e-mail) or survey invitations (for a web survey) to 150 additional e-mail addresses was the equivalent of adding one extra contact to a mailing sample.

2.2.2 Faster Turnaround

Turnaround times of online survey are considered to be much faster. In the mixed mode e-mail invitation and HTML form study McDonald and Adam (2003) did, 40 per cent of responses were received in the first 24 hours, and over 85 per cent of responses were received within seven days. (Table 1)

2.2.3 Broader Range of Stimuli Potential

The fast development of computer technologies offer researchers richly tools to design and issue the surveys. Through the inclusion of color, graphics and sound, the boring questionnaire or survey will be interesting. Some of websites even use interactive windows during the survey. All of these stimulate the participation of surveys.

2.2.4 Sampling Difficulties

Although online survey is efficient at collecting a large data, several problems still exist making sampling difficult.

First of all, it may fail to develop a sample that is representative of the population as a whole. As previous research showed, regardless of the fact that the number of people who has internet access is increasing dramatically, the majority of internet population is still standing on younger and higher standard of education field than the public at large.

Secondly, the lack of a centralized database of e-mail addresses makes a major difficulty for e-mail survey. Dommeyer and Moriarty (2000) mentions that sampling of survey through e-mail is difficult because they frequently become outdated as internet users change their e-mail providers. In a study of Oppermann (1995), it was discovered that of the 500 e-mail addresses that were selected from the members directory of Association of American Geographers (AAG), 25 per cent were out of date.

2.2.5 Response Rate

Although the response rate of e-mail or/and HTML surveys is often claimed high, many researches showed that responses to internet surveys tend to vary according to the field of study. Table 2 shows the response rate of online and traditional data collection methods.

We can find from Table 2 that, with the exception of Parker's study (1992), response rates from surveys employing online methods (e-mail, HTML web, or the combination of these two) tend to be lower than those of traditional methods.

2.3 Data Mining

Data mining has a very close relation with data on-line collection. It's hard to separate them from each other. Internet data collection has created an increased demand for data-mining tools.

Data mining is defined as a class of database applications that look for hidden patterns in a group of data that can be used to predict future behavior. For example, data mining software can help retail companies find customers with common interests. The term is commonly misused to describe software that presents data in new ways. True data mining software doesn't just change the presentation, but actually discovers previously unknown relationships among the data. It is popular in the science and mathematical fields but also is utilized increasingly by marketers trying to distill useful consumer data from Web sites.

Data mining is rapidly becoming the mainstream in marketing research in recent years due to the need for consumer-centric marketing. The goal of customer-centric marketing is to seek to better understand the customers, thus, sophisticated data mining applications are required. Usually, companies are interested in collecting customers' data such as buying patterns, demographic, and psychological trends and other types of customer knowledge. Based on this detailed information, companies will be able to create appropriate targeted marketing plans. Then the marketer can correlate those data with information they have and find out who the most profitable customers are. However, sometimes it is difficult to collect data about people who have bogus information. In this case, the marketer needs to use data-cleansing tools to identify whether the data is valid and filter out junk data from the main database, so that the marketer will not make wrong decisions because of those errant data (Harter 1999).

2.4 Barriers of Internet Surveys Development

Internet survey research also has some barriers on. Issues such as consumer privacy and non-representative of Internet samples are often- mentioned disadvantages. We will discuss these issues in detail in the following.

2.4.1 Privacy issues

The growing application of the Internet in marketing research has enabled companies and marketers to obtain consumer information efficiently (Blattberg, Glazer, and Little 1994; Milne 2000). However, as companies are increasingly using sophisticated data-mining techniques to build extensive consumer databases, security on the Internet becomes a concern and consumer privacy is potentially violated during the process of information exchanges with marketers (Bloom, Miline, and Adler 1994; Miline 2000). As Miline indicates, information exchanges can occur in two different ways: "In some ways consumers volunteer the information, and in others the information it is gathered without consumers' knowledge and consent " (Miline 2000). As consumers become comfortable shopping online, filling out surveys, and giving their credit card information over the Internet, they have control over their personal information and are aware of what information is given out. An industry-sponsored poll indicates that "online shoppers do not mind their behaviors being watched if their shopping experience can be customized and they have an opportunity to opt out " (Greenberg 2000; Miline 2000). Unfortunately, by using cookies and tracking software, many organizations engage in data collection activities " that customers do not perceive as favorable" (Miline 2000). For example, companies such as DoubleClick can merge cookies to help online marketers to track consumers' online behavior such as click-and -viewing patterns. This information permits companies to sell advertising on their Website, which in turn, "contributes to consumers' concerns about profiling and unwanted e-mail solicitations" (Caudill and Murphy 2000; Petty 2000; Miline 2000). Another concern of consumer privacy is that consumer information on a database is potentially accessible to the entire Internet world (Miline 2000). As the result, whether consumers are willing to make or not to make a trade-off and permit marketers or organizations to collect their personal information become important issues for online marketing practices. Recently, the FTC unanimously supported unanimously supported a self-regulatory proposal developed by the Network Advertising Initiative, a coalition of third-party ad-servers such as DoubleClick, 24/7 Media and Engage to protect consumers' online privacy (AdAge 2000). In addition, technological solutions nowadays also enable consumers to protect their identity while providing information to marketers.

2.4.2 Biased results

Non-representative of Internet samples is one of major disadvantages of online data collection. The expense and effort can be tremendous for correcting biased results. In *Research and the Internet: A Winning Combination*, Clarkson (1999) shows a few examples of how companies handle biased results. For example, instead of distributing surveys to its customers, Drugstore.com places the survey on its Website, which allows customers volunteer the information. The bottom line for this data collection method is that as long as the demographics of the Web are close to the demographics of the people the company tries to reach, the results are acceptable (Clarkson 2000). As Clarkson indicates, it is general belief that "the data collected would lead to good insights regarding the potential market, and the skewed demographics could be corrected by using statistical techniques to weight the actual responses to bring them in line with the demographics of the population at large" (Clarkson 2000). However, some companies such as Gallup challenges such a belief by conducting more rigorous research procedures combining traditional and Internet research methods in order to obtain scientifically accurate online data results. Gallup first conducts telephone interviews with all potential respondents. Gallup then mails letters, which include a personal identification number (PIN) and an Internet address, to the screened respondents. In this scenario, survey responses can be tied back to information already known about the individuals by comparing data with their original identification codes (Weissbach 1997). This way enables Gallup to maximize participation and representativeness as well as trace who has completed or has not completed the survey. After two weeks, e-mails are also used for reminding people to fill out their survey. In order to increase response rates, Gallup also provides $5 cash reward for respondents who complete the survey. Clarkson also indicates that depending on the company and the respondents being surveyed, the Web-based survey is not always appropriate. The company must evaluate its problem and situation carefully before using Internet survey to gather the data.

Another reason for getting biased results in online data collection is due to limited usage of the Internet. Despite the rapid growth of personal computers, Internet usage penetration in every household is not as prevalent as television does. Besides, Internet users tend to be younger, more educated, and affluent. As a result, elders and people with less education and less income are more likely to be ignored by marketing researchers. Moreover, due to the nature of electronic questionnaires, Internet users can choose to discard and not to fill out the survey (Iyer 1996). In this case, the marketing researcher may need to use some incentives to attract people. For example, enticements could include entry in a contest, the chance to download some personal software, and participation in a game (Weissbach 1997).

3. Conclusion & Suggestion

The appearance and fast growth of internet benefit marketing research a lot. Comparing with traditional methods, internet data collection provides a cheaper and easier tool to collect data. Faster turnaround is offered, too. That allows business to record market-related data efficiently. However, there are a number of unfavorable natures. As for online-survey, uneven online population makes sampling difficult. That, furthermore, influences the quality of the survey results. Low response rate is another existing problem needs improving.

As some researches shown that, in current circumstance, internet based research should be used along with other methods as an additional supporting tool rather than as an alternative to traditional research approaches. However, for some organizations requiring specialist areas of research such as employee surveys and web site evaluation, an internet survey may be the most cost effective and appropriate way of carrying out the research.

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Table 1. Cumulative Response for Online & Postal Data Collection

Days from Invitation	Online Cumulative Response (%)	Postal Cumulative Response (%)
1	39.1	0.0
2	52.0	0.0
3	60.2	0.0
4	75.5	2.3
5	81.9	2.7
6	84.5	9.0
7	86.7	9.0
8	88.8	9.86
9	89.9	10.2
10	90.9	52.6
11	92.0	76.4
12	93.1	85.2
13	94.1	95.1
14	95.3	95.8
15	96.2	97.5
16	96.7	97.5
17	97.0	98.4
18	98.3	98.6
19	99.6	98.6
Cut-off day	100.0	100.0

Note: weekends and non-postal delivery days not included

Sources: Heath McDonald & Stewart Adam (2003)

Table 2. Response Rate of Online and Traditional Data Collection Methods

Author(s) and year	Online survey	Traditional survey	population
AFC (present study)	21w	46p	AFC members
Couper et al. (2001)	41w		Random sample of 1602 University of Michigan students
Adam and Deans (2000)	17w		Australian and NZ online business directors and managers
Bachmann et al. (2000)	19e	46p	Business school deans and chairs
Weible and Wallace (1998)	30e 34h	36p 31f	MIS faculty, mainly North America
Schaefer and Dillman (1998)	54e	58p	Washington State University faculty
Tse (1998)	7e	52p	Chinese University of Hong Kong teaching and admin staff
Noh (1998) [b]	31e		Public email directory [b]
Zelwetro (1998) [b]	38e	36p	na[b]
Besser (1997) [c]	20e	16p	Former members of the Rural Sociological society
Couper et al. (1997) [c]	43e	71P	Employees of US government statistics agencies
Smith (1997) [c]	8e 13e		Members of Web consultants association
Williams et al. (1997) [c]	27e	75p	Lowa State University students
Bachmann et al. (1996) [c]	53e	66p	Business School Deans in the USA
Comely (1996)	14e 47o	15p	Purchased list of UK Internet magazine subscribers
Hertz et al. (1996) [a]	69e	96t	Health care workers using CDC Wonder
Parks and Floyd (1996) [a]	33e		USENET newsgroups
Mehta and Sivadas (1995) [c]	40e	64p	Users of an electronic bulletin board
Opperman (1995) [c]	49e	26p 33p	American Association of Geographers
Kittleson (1995) [c]	28e	77p	International Directory for Health Educators
Tse (1995) [c]	6e	27p	Chinese University of Hong Kong teaching and admin staff
Schult and Totten(1994) [c]	19e		Marketing and MIS faculty at US universities
Parker (1992) [c]	68e	38p	AT&T employees
Walsh et al. (1992) [c]	76e		Subscribers to online user group
Liesler and Sproull (1986) [b]	67e	75p	Fortune 500 company department
Sproull (1986) [c]	73e	87t	Fortune 500 company department

Note: e = e-mail; h = HTML form; w = e-mail plus HTML form; o = postal plus HTML form; p = post; t = telephone; f = fax

Sources: Cho and LaRose (1999);   [b] Dommeyer and Moriarty (2000); [c] Schaefer and Dillman (1998)

Total Quality Management in the Malaysian Automobile Industry

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Abstract

Due to global competition, companies have indeed emphasized that quality should have to be put in place, integrated into all aspects of products and services within their management system.   Hence total quality management (TQM) has become increasingly popular as one of the managerial devices in ensuring continuous improvement as to improve customer satisfaction and retention as well as to ensure its product or service quality. Importantly, employees are regarded as the most important entity in ensuring that total quality management (TQM) can be carried out successfully in an organization. Therefore, this paper will address certain issues based on employees' perspectives with regard to TQM implementation in the SMEs of the automobile industry in Klang Valley. Specifically, the research would identify the perceptions towards TQM among the employees in the small-medium industry in the automobile sector. Secondly, to determine the important factors towards TQM implementation as perceived by those employees.   Finally, to ascertain whether there are other measurements employed by the SMEs of the automobile industry in ensuring quality.

Keywords: Small-medium enterprise, Perception, Total quality management, Automobile industry

1. Introduction

Quality is a term that carries important meaning to both producer and customer.   In the global marketplace today, many organizations realized that its survival in the business world depend highly on producing high quality product and services. Indeed, a lot of organizations have emphasized that quality should have to be put in place, integrated within the management system, especially in terms of bringing the end products or services to the customers, especially with the intense competition arriving from the rivals**.** Accordingly, total quality management (TQM) has become increasingly prevalent as one of the management strategies in ensuring customer satisfaction and loyalty, improving products and service quality and reinforcing continuous improvement.

This research investigates total quality management (TQM) of the small and medium scale enterprises (SMEs) in the automobile industry due to the general quest for quality-produced cars and the increasing competition between the local car producer and foreign car manufacturer.   The automotive industry is chosen for the present study due to its

importance and emphasis place in the manufacturing sector to boost the industrialization process in order for Malaysia to be a developed nation by 2020 (http://www.unescap.org, assessed on 24 April, 2007). In addition, total quality management (TQM) would be one of the measurements to ensure that the cars produced are reliable, satisfied by the consumers at large and to ensure competitiveness in the market, as well as conforming to the international standard. Therefore, the objectives of this study are three-folds, namely (i) to explore the perception of employees pertaining to the implementation of total quality management (TQM) in the automobile industry, (ii) to identify at which attribute of TQM has been chosen most by the respondents and (iii) to determine whether there are other quality measurements besides TQM that has been practiced in those respective organizations.

2. Methodology

This study is based on small and medium-sized enterprises (SMEs) in the Malaysian automobile industry. It is empirical as it aims to discover the perceptions of employees towards the implementation of Total Quality Management (TQM) in their organizations. Questionnaires were adopted from Zhang *et al.,* (2000) based on 11 variables which include training, reward and recognition, product or service design, supplier quality management, employee participation, customer focus, process control and improvement, evaluation, vision and plan statement, quality system improvement and   leadership.   Though in terms of reliability, it has been proven valid and reliable (Zhang *et al*., 2000) since the questionnaires were tested and validated on 212 Chinese manufacturing companies, but yet this study also had conducted the reliability test. The reliability of the factors was determined by establishing their alpha weighting using Cronbach's alpha coefficient.   Construct validity was assessed using factor analysis.   The result of reliability shows that the item loading was 0.875, thus it was concluded that the scales had good construct validity.   A total of 300 questionnaires were sent to employees of the SMEs of the automobile industry in Klang Valley on a purposive sampling basis. However, only 150 employees managed to respond which gives a response rate of 43.5%.   Those organizations were based from Small and Medium Industries Development Corporation (SMIDEC) directory that constitute organizations that generally supply parts or provide services to the automobile industry (see **Table 1**).   In addition to those lists, questionnaires were also sent to organizations that meet the SMEs definition, and supplying parts to Proton and Perodua or other car producer.   The questionnaire basically consisted of questions to infer the employees' perception on the concept of TQM, using a five point Likert type scale, with a response of 1 indicating that respondents disagree with the item perceived and 5 indicating that respondents agree with the item perceived.

3. Results and discussion

3.1 Demographic profile of respondents

Table 2 shows the demographic profile of the respondents. A total of 52.7% of the respondents were male and 47.3 % were female.   In terms of the level of education, most of the respondents completed their secondary educational level (44.0%), followed by having their first degree (26%), diploma/certificate (18.7%) and completed their primary education (11.3%). The above table also shows that 34.7% of the respondents were administrative officer, executive (33.3%), technical supervisor (28.7%) and top management (3.3%).

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3.2 Understanding on the Concept of TQM by respondents

The respondents were also being asked to indicate their general understanding on the concepts of TQM (**Table 3**).   In generally 40.7% of the respondents associated TQM as total customer satisfaction, 34% viewed it as continuous improvement, 13.3% relates it to management leadership and commitment, while 10.7% associated it with employees' involvement.   The least opinion relates TQM with training and reward (1.3%).   Eventually, the highest perception of TQM among employees relates to total customer satisfaction (4.13), followed by employee involvement, training and education (4.00), then management leadership and commitment (3.95) and finally, continuous improvement (3.82).

In order to further explore the perception of employees on the importance of TQM, a set of variables were listed to measure the degree of its important to the respondents on TQM, on a scale ranging from 1(disagree) to 5 (agree). Among the 11 variables measured based from Zhang *et al.* (2000) were training and education, reward and recognition, service design, quality system improvement, employee participation, customer focus, process control and improvement, evaluation, vision and plan statement, leadership, and supply quality management. Based on responses to the TQM variables, **Table 4** provides mean of different employees in their perception of TQM. The result indicates that in terms of TQM variables, training and education is perceived the highest (4.09), followed by service design (4.0) and quality system improvement (3.96). The result presented in **Table 4** indicates the differences of perception among the respondents on TQM variables.   Since training and education shows the highest mean score (4.09), the study will

highlights the relationship between training and education with the respondents' perception of TQM.

Table 5 illustrates the relationship between respondents' understandings on the concept of TQM with training and education. For the respondents who perceived TQM as management leadership and commitment, any follow up activities made by the management for improvement of quality job is very important (4.45). It is followed by problem solving and availability of resources for employee education and training (4.35). The least perception is on attending training program (3.95). For those who regard TQM as continuous improvement, to them employee should be regarded as the most valuable resources in ensuring the better performance of the company (4.18). They also perceived that the employees should be given greater involvement in the training program as a motivation for them to perform the job (4.12) as well as the management should made resources for employees' education and training are available (4.12). 40.7% of the respondents have associated their understanding of TQM to be total customer satisfaction. For those who regards TQM as total customer satisfaction has definitely says that the employees should be given the quality awareness education in order to ensure that the customer will satisfied with the service given (4.43). Then it followed by the importance of imparting MS ISO training awareness to the employees in order to improve their job performance (4.31). The result also shows that for those who considered employee involvement as TQM has different perception on the training variables. To them, MS ISO training awareness and greater involvement of employees in training program should be given priority (4.50). The employees also perceived that they should be exposed with a new skill on improvement of quality to reduce defective production and goods service (4.38).

The respondents were then asked on the reasons for the implementation of TQM in the organization. **Table 6** shows that majority of respondents agreed that with the implementation of TQM the company would be able to increase efficiency and productivity (53.3%), followed by the ability deliver high level of service to the customers (17.3%), to be more competitive (13.3%), to ensure better utilization of resources (10.0%) and lastly, the ability to prepare for continuous improvement (6%). The research is would also seek to identify whether there are other measurements that have been used and implemented by the organizations in terms of quality initiatives besides TQM (**Table 7**). The result in **Table 7** shows that 52.7% are implementing TQM in managing their quality system, followed by Six Sigma 17.3%. TQM is indeed, agreed upon as one of the ways of managing organizations to improve efficiency and effectiveness (Zhang *et al.,* 2000). Nevertheless, there is not much conformity in terms of the overall view of TQM since TQM connotes different meaning to different people (Hackman and Wageman, 1995). Therefore, this study seeks to determine employees' perception on TQM since organizational performance depends highly on the performance of employees (Rodwell *et.al.*, 2000). Furthermore, this study is conducted in the automobile industry of the small-medium enterprises (SMEs) to identify their perception on the implementation of TQM. Consequently, many researches have contributed toward the critical success factors on TQM implementation (eg., Lau and Idris, 2001; Idris, McEwan and Belavendram 1996; Dean and Helms, 1996; Thiagarajan, *et al*., 2001 and Behesti and Lollar, 2003). From the study, customer satisfaction is perceived the most by the employees in terms of their understanding of TQM which correspond with Bowen and Waldman (1999) argument that the most important requirement for long-term organizational success is customer satisfaction. Accordingly, customer satisfaction can only be achieved if the company continuously put an effort to improve the quality system (Robinson and Pearce, 1998). Ultimately, employees perceive their involvement as an important concept of TQM and this coincides with Dean and Helms (1996) study on the public sector agencies. In terms of the reason of implementing TQM, many of the employees perceived that organizations implement quality system mainly to increase their efficiency and productivity and this has been supported by Beshesti and Lollar (2003). Surprisingly, they neither perceive continuous improvement as one of the important component of TQM nor as the reasons for its implementation. One possible reason why continuous improvement is perceived less by the employees may due to the lack of emphasis of long-term implementation in TQM. Probably, it may also owe by the fact that some organizations implement TQM in order to gain ISO certification or other quality certification. Importantly, training and education, followed by service/product design and quality system improvement are regarded as the most important factors perceived by employees among the 11 dimensions of critical success factors of TQM implementation in the automobile industry of the SMEs. The findings however did not support Eng and Yusoff (2003) study where they mentioned that training and education for the implementation of TQM practices tend to be successful only in large companies compared to SMEs. The other factors that are perceived important are service/product design and quality system improvement and this has been supported by Thiagarajan, *et al*. (2001) who also did a study on TQM implementation in Malaysia.

4. Conclusion

Even this study presents a general framework for advancing the knowledge and perception of the employees on TQM, it may help the automobile industry to improve their service to the customer. In fact, quality control is much required in small firms as to emulate the big companies as well as to match the quality to differentiate their product or services from their competitors. Furthermore, TQM will give an impact towards significant returns, performance improvements, better teamwork and decision in services.

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Table 1. Definition of SMEs by Small and Medium Industries Development Corporation (SMIDEC) by Size

Category	Micro-Enterprise	Small Enterprise	Medium Enterprise
Manufacturing, Manufacturing-Related Services and Agro-based industries	Sales turnover of less than RM250,000 OR full time employess less than 5	Sales turnover between RM250,000 and less than RM10 million OR full time employees between 5 and 50	Sales turnover between RM10 million and RM25 million OR full time employees between 51 and 150
Services, Primary Agriculture and Information & Communication Technology (ICT)	Sales turnover of less than RM200,000 OR full time employees less than 5	Sales turnover between RM200,000 and less than RM1 million OR full time employees between 5 and 19	Sales turnover between RM1 million and RM5 million OR full time employees between20 and 50

(source: Small and Medium Industries Development Corporation (SMIDEC)

Table 2. Respondents Demographic Profile

Variables	%	N
Gender		
Male	52.7	79
Female	47.3	71
Ethnic Group		
Malay	77.3	116
Chinese	9.3	14
Indian	7.3	11
Others	6.0	9
Years of working		
Less than one year	9.3	14
5-10 yrs	21.3	32
1-5 yrs	49.3	74
Over 10 yrs	20.0	30
Job status		
Technical Supervisor	28.7	43
Executive	33.3	50
Administrative Officer	34.7	52
Top Mgt	3.3	5
Education level		
Primary and Below	11.3	17
Secondary	44.0	66
College	18.7	28
University	26.0	39
Income		
Less than RM 1000	19.3	29
RM3001-RM5000	21.3	32
RM1001-RM3000	55.3	83
More than RM 5000	4.0	6

Table 3. Respondents' Understanding on the Concept of TQM

Items	Percentage	Mean	Frequency
Management leadership and commitment	13.3	3.95	20
Continuous improvement	34.0	3.82	51
Total customer satisfaction	40.7	4.13	61
Employee involvement	10.7	4.00	16
Training and education	1.3	4.00	2

Table 4. Mean for TQM variables

TQM variables	Mean
Training and education	4.09
Reward and recognition	3.81
Service/product design	4.00
Quality system improvement	3.96
Employee participation	3.75
Customer focus	3.95
Process control and improvement	3.74
Evaluation	3.94
Vision and plan statement	3.92
Leadership	3.70
Supply quality management	3.47

Table 5. Understandings on the Concept of TQM and Training by Respondents

Concept of TQM		Program attended	Learning	Awareness	Follow up	Problem	Motivate	Satisfied	Education	Resources	Employee	Quality Awareness
Mgt Leadership and Commitment	Mean	3.95	4.10	4.25	**4.45**	4.35	4.15	4.20	4.15	4.35	4.00	4.00
	S.D	.686	.553	.716	.686	.745	.813	.834	.813	.813	.918	.918
Continuous Improvement	Mean	3.82	4.02	3.90	4.08	4.08	4.12	3.96	4.04	**4.18**	4.12	3.71
	S.D.	.518	.948	.806	.771	.627	.791	.799	.799	.713	.653	.879
Total Customer Satisfaction	Mean	4.13	4.21	4.31	4.15	4.03	4.20	4.05	4.20	4.13	4.21	**4.43**
	S.D.	.826	.661	.807	.628	.795	.628	.740	.813	.846	.859	.741
Employee Involvement	Mean	4.00	4.38	**4.50**	4.00	3.75	**4.50**	4.13	4.00	3.75	4.13	3.87
	S.D.	.730	.500	.730	.730	.856	.516	.619	.730	.683	.806	.619

Table 6. Perceptions of Employees on the Importance of TQM Implementation

Items	%	N
To be competitive	13.3	20
To increase efficiency and productivity	53.3	80
Better utilization of resources	10.0	15
For a high level of service to the customers	17.3	26
For continuous improvement	6.0	9

Table 7. Other Measurements Employed by SME

Measurements	%	N
Six Sigma	17.3	26
Balance Scorecard	14.0	21
Total Quality Mgt	52.7	79
Others	16.0	24
Total	100.0	150

The Implication of Fuzzy Comprehensive Evaluation Method

in Evaluating Internal Financial Control of Enterprise

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Abstract

Internal financial control is an important part of internal control in enterprise, and it is also an important part of the structure of enterprise governance. It is an important way of improving competitive power of enterprise to strengthen and consummate the internal financial control of enterprise. So a reasonable method should be used to evaluate the internal financial control of enterprise. On the basis of the evaluation index system of the internal financial control of enterprise, fuzzy comprehensive evaluation method is utilized to evaluate the internal financial control of enterprise synthetically which accords with the characteristic of the internal financial control of enterprise and has maneuverability.

Keywords: Enterprise, Internal Financial Control, Fuzzy Comprehensive Evaluation Method, Maximum Subordination

1. Introduction

Internal financial control is the application of the control theory in corporate finance activities. It is the collective of a range of methods, techniques, procedures and concept by use of the basic principles and methods of control theory to bound and evaluate the financial activities in order to achieve the financial targets (Huang Juan, Wei Lang, 2003). Internal financial control of the enterprise is an important part of internal control and corporate governance. It is an important way of improving business competitiveness to strengthen and improve the internal financial control. Hence it is need to build an all-round, multi-angle evaluation index system of reflecting the level of internal financial control, to use reasonable means to evaluate comprehensively the level of internal financial control, to strengthen and perfect the internal financial control of the enterprise in multi-angle views in order to improve the level and quality of internal financial control and then help to improve the competitiveness of enterprises comprehensively. As the related procedures and factors of internal financial control is complex and fuzzy, the text is to use fuzzy comprehensive evaluation method to evaluate the quality and level of internal financial control in order to promote the enterprise to be aware of its own situation of internal financial control, and then to take measures to enhance the competitiveness of businesses.

2. Introduction of Fuzzy Comprehensive Evaluation Method

Fuzzy comprehensive evaluation method is a mathematical method to comprehensively evaluate things that are not easy to be clearly defined in the real world by using the thinking and methods of fuzzy mathematics. Fuzzy mathematics was born in 1965, its founder is professor Chad (LAZadeh) who is an automatic control expert of the United States. For more than 30 years, fuzzy mathematics has a rapid development in theory and a wide use in practice. Fuzzy comprehensive evaluation method is a method to comprehensively evaluate systems by using fuzzy set theory of fuzzy mathematics. Through the fuzzy evaluation information about the priority of various alternatives can be achieved as a reference for decision makers to make decision.

When Fuzzy comprehensive evaluation method is used, we should create fuzzy comprehensive evaluation index system first of all. The establishment of fuzzy comprehensive evaluation index system should be guided by the following basic principles: (1) The overall evaluation index system should be complete; (2) The evaluation index in evaluation index system must be measurable and comparable; (3) The human element in the evaluation index should be highlighted and human factors of evaluation in education should be fully infiltrated; (4) The level of evaluation in evaluation index should not be divided too thin.

Specifically, the application steps of fuzzy comprehensive evaluation method are as follows:

2.1 To determine the factors set in Judge

According to the nature of the characteristics of the first level index in the evaluation index system, the factors se t in the evaluating relationship are as follows:

U= { u_1, u_2, u_3, ... u_n }.

2.2 To determine the evaluation (comments) set in judge

The evaluation set is set to be followed:

V= { v_1, v_2, v_3, ... v_m }.

2.3 To establish the single-factor evaluation matrix R from U to V

Each factor u_i (i≤n) should be evaluated single-factor. As there are different types of evaluation level (or reviews),the evaluation result of each factor is a fuzzy set of evaluation set V which can be written as the fuzzy vector $R_i =(r_{i1}, r_{i2}, r_{i3}, ... r_{im})$(i=1,2,…,n), $R_i \in \mu(V)$.The results of these evaluations meet the normalized conditions and the sum of the weight of the vector is 1, that is, for every i, there is: $r_{i1} + r_{i2} + r_{i3} +…+ r_{im} =1$.

All of the single-factor evaluation constitutes the fuzzy relationship R from U to V: R= (rij) ^{nm}

That is,

$$R=\left(r_{ij} \right)_{mn} = \begin{pmatrix} r_{11} & r_{12} & r_{13} & \bullet\bullet\bullet & r_{1m} \\ r_{21} & r_{22} & r_{23} & \bullet\bullet\bullet & r_{2m} \\ \bullet\bullet\bullet & \bullet\bullet\bullet & \bullet\bullet\bullet & \bullet\bullet\bullet & \bullet\bullet\bullet \\ r_{n1} & r_{n2} & r_{n3} & \bullet\bullet\bullet & r_{nm} \end{pmatrix}$$

2.4 To determine the weight of index

Weight means the proportion of each evaluation index in the evaluation index system based on importance. The impact of different factor in factors set is inconsistent with things that have been judged. If a weight is given to a factor, the weight distribution set A of factors can be seen as a fuzzy set of factors set U which is recorded as: A={ a_1, a_2, a_3, ... a_n }.It is required to meet the normalized conditions:

$$\sum_{i=1}^{n} a_i = 1 \text{, and } 0 < a_i < 1.$$

2.5 To get the results of evaluation

The results of evaluation can be get through multiplying the vector of the index weight and the matrix R of single-factor evaluation:

B=A•R= (b_1, b_2, b_3, ... b_m)

2.6 To get the conclusion of judge

The set B is normalized, that is, each weight is divided by the sum of all the weight in the set B. The subordination of the first i-level of evaluation to R_i is the share of v_i in the results of comprehensive evaluation. According to the principle of maximum subordination, the corresponding evaluation level of the maximum subordination is the hierarchy of a judge in the set B,which is the conclusion of the comprehensive evaluation.

3. The evaluation index system of internal financial control in enterprise

When Fuzzy comprehensive evaluation method is used to evaluate the internal financial control of the enterprise, the

fuzzy comprehensive evaluation index system is firstly needed. As internal financial control is a complex and systematic project in business, it is necessary to establish a comprehensive and multi-angle evaluation index system to reflect the level of internal financial control in order to reflect the overall level of the internal financial control objectively, accurately and completely. The evaluation index system of internal financial control should be designed from all of the aspects in internal financial control, such as control subject, control content, control environment and control objective and so on.

3.1 Control Subject

The control subject of internal financial control is the perpetrator of the activities in the internal financial control of business, which should be evaluated from such aspects as professional quality, moral qualities and learning potential.

3.2 Control Content

The control content of internal financial control is the target of internal financial control in enterprise, including the control of fund-raising activities, investment activities, asset management activities and earnings management activities.

3.3 Control Environment

The control environment of internal financial control is factor that has impact on internal financial control, including internal and external factors. Specifically, the control environment includes the following major areas: legal environment, market mechanism, corporate governance, organizational structure, human resources environment and information systems.

3.4 Control Objective

The control objective of internal financial control is the purpose that the enterprise is to get through internal financial control, which should be evaluated from such aspects as risk assessment, financial supervision, transaction costs reduction and deviations amendment.

Thus the evaluation index system of internal financial control is established as that in the following table:

Insert Table 1 Here

4. Evaluation of Internal Financial Control in Enterprise Based on Fuzzy Comprehensive Evaluation Method

The following is the example of a corporate which is used to show the application of fuzzy comprehensive evaluation method in the internal financial control of enterprise.

4.1 To determine the factors set of evaluation in Internal Financial Control of Enterprise

The evaluation of internal financial control in enterprise is an issue of complex multi-objective decision-making. In this paper, four factors in the table are selected as the evaluation factors set U in internal financial control: U= $\{u_1, u_2, u_3, u_4\}$ = {control subject, control content, control environment, control objectives}.

4.2 To identify the comments set of evaluation in Internal Financial Control of Enterprise

As the evaluation of factors of internal financial control in enterprise is vague, the comments set V of the evaluation of factors is divided into five levels:

V= $\{v_1, v_2, v_3, v_4, v_5\}$

= {Excellent, good, medium, pass, fail}.

4.3 To establish the single-factor evaluation matrix R from U to V

A group of broadly representative experts (10) are selected to compose of the expert evaluation team of internal financial control in enterprise, who are charged of evaluating internal financial control of the enterprise. After members of the Expert Group learn more about internal financial control of the enterprise, the experts independently decide the level of the evaluation factors to the internal financial control of enterprise.

After the experts' fuzzy evaluation on indicators of the above-mentioned four factors, the result is as follows:

As far as internal financial control subject is concerned, 2 of the experts think it excellent, 3 think it good, 4 think it middle, 1 thinks it pass, 0 thinks it fail.

Then the subordination of the level of comments on the factor of control subject influencing internal financial control of enterprise: 0.2, 0.3, 0.4, 0.1, 0. It Can also be written in fuzzy vector R_1 = (0.2, 0.3, 0.4, 0.1, 0).

Similarly, results of the evaluation on the other three factors are as follows:

R_2 = (0.1, 0.2, 0.4, 0.2, 0.1);

$R_3 = (0, 0.2, 0.4, 0.3, 0.1);$

$R_4 = (0.1, 0.4, 0.4, 0.1, 0).$

The results of these evaluations meet the normalized conditions and the sum of the weight of the vector is 1.

According to the results of above four single-factor evaluation, the single-factor evaluation matrix is as follows:

$$\mathbf{R} = (r_{ij})_{4\times5} = \begin{pmatrix} 0.2 & 0.3 & 0.4 & 0.1 & 0 \\ 0.1 & 0.2 & 0.4 & 0.2 & 0.1 \\ 0 & 0.2 & 0.4 & 0.3 & 0.1 \\ 0.1 & 0.4 & 0.4 & 0.1 & 0 \end{pmatrix}$$

4.4 To determine the weight of index

According to the influence on internal financial control of each factor in factors set of evaluating internal financial control of enterprise, the weight of each factor is as follows:

Factor	Control subject	control content	control environment	control objective
Weight	0.2	0.3	0.3	0.2

The weight meets the normalized conditions: 0.2+0.3+0.3+0.2=1

The weight set of each factor can be set as a fuzzy set of factors set:

A= { a_1, a_2, a_3, a_4 } = {0.2, 0.3, 0.3, 0.2}

Or be written in the form of fuzzy vector:

A= (0.2, 0.3, 0.3, 0.2)

4.5 To get the result of evaluation

The comprehensive result of experts in evaluating the internal financial control of enterprise is as follows:

B=A•R

$$= (0.2, 0.3, 0.3, 0.2) \bullet \begin{pmatrix} 0.2 & 0.3 & 0.4 & 0.1 & 0 \\ 0.1 & 0.2 & 0.4 & 0.2 & 0.1 \\ 0 & 0.2 & 0.4 & 0.3 & 0.1 \\ 0.1 & 0.4 & 0.4 & 0.1 & 0 \end{pmatrix}$$

= (0.09, 0.26, 0.4, 0.19, 0.06)

The result showed that 9 percent of the experts believe that the internal financial controls of the enterprise is excellent, 26% believe good, 40% believe medium, 19% believe pass, 6% believe fail.

4.6 To get the conclusion of evaluation

The sum of the weight in the results set B-vector is 1 and meets the normalized conditions.According to the principle of

maximum subordination, the evaluation level "medium" corresponding to the maximum subordination in set B should be the evaluation conclusion of internal financial control in enterprise. Namely: the level of internal financial control of the enterprise is medium.

5. Conclusion

The evaluation of internal financial control in enterprise can show all employees the current level of internal financial control, and promote all employees in enterprise to take action to build and enhance internal financial control of enterprise. As the internal financial control is a fuzzy thing, the fuzzy comprehensive evaluation method is operational in evaluating it and is an effective method.

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Table 1.

evaluation index system of internal financial control in enterprise		
target layer	index of first level	index of second level
Internal Financial Control in Enterprise	Control Subject	professional quality
		moral qualities
		learning potential
	Control Content	control of fund-raising activities
		control of investment activities
		control of asset management activities
		control of earnings management activities
	Control Environment	legal environment
		market mechanism
		corporate governance
		organizational structure
		human resources environment
		information systems
	Control Objective	risk assessment
		financial supervision
		transaction costs reduction
		deviations amendment

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