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AN ANALYSIS OF IT EXPECTATION ACROSS DIFFERENT STRATEGIC CONTEXT OF INNOVATION: THE CEO VERSUS THE CIO

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ABSTRACT

There is a wide array of research on the topic of the chief executive officer (CEO)-chief information officer (CIO) relationship that affects the strategic use of information technology (IT) (i.e., strategic alignment). However, the literature about divergent perception of IT expectation between the two groups, depending on their emphasis of innovation is sparse. This study fulfils this gap. Questionnaires were sent to both CEOs and CIOs in 745 non-manufacturing companies in Taiwan, and good matched-pair surveys totalled 119. Results suggested that aggressive innovative companies tend to have higher CIO satisfaction and lower CEO satisfaction with the IS planning process and with the outcomes after the use of IT and vice versa. Implications of results are discussed.

Keywords: Innovation, IT Expectation, Strategic Alignment

1. INTRODUCTION

Researchers and practitioners have recognized that information systems (IS) executives should manage their senior management's expectation concerning the use of IT within the organization (Potter, 2003). To reduce the expectation gap, CEOs must recognize the strategic potential of IT and be knowledgeable about information opportunities. Simultaneously, CIOs must demonstrate strong command of business requirements and the ability to communicate the business benefits of IT. This CEO-CIO relationship indicates a central theme of strategic IS planning that effective use of IT requires "strategic alignment" (i.e., alignment of IS and business strategies) (Tallon, Kraemer Gurbaxani, 2000).

Through strategic alignment, the CEO and the CIO are more likely to work in harmony and improve their strategic actions (Jarvenpaa & Ives, 1990). Many conceptual and anecdotal evidences have shown that the CEO-CIO relationship links to effective strategic alignment (see Kearns, 2000; Byrd, Lewis & Bryan, 2006; among many others) and demonstrated that business-oriented IS leadership is the key to overall organization's survival. Such an effective alignment promotes the use of IT for competitive advantage that affects organizational performance (Sethi & King, 1991; Kearns & Lederer, 2000).

Although the extant literature has made significant examination toward the CEO-CIO relationship and its impact on strategic alignment, a deeper understanding can be achieved by linking the CEO-CIO relationship to contextual aspects (e.g., environment response) that are critical to performance measures (e.g., strategic alignment). Thus, our research question is that *"given various level of adaptation to the environment, do perceptual differences between the CIO and the CEO with regard to organizational performance exist"?* Since contextual factor "adaptation to the environment" can be viewed as a company's innovative behaviour to retain strategic alignment (Miles & Snow,

1978), we attempt to examine how a company's innovation will influence its IT expectation (i.e., organizational performance after the use of IT) of both CEO and CIO. A deeper understanding of the CEO-CIO relationship across different innovation will enable organizations to craft appropriate policies to reap maximum benefit from using IT.

2. BACKGROUND

2.1 CEO / CIO Relationship

The relationship between the CEO and the CIO is crucial to IS success (Ranganathan & Kannabrian, 2004). CEOs must understand what IT can do for their organizations and thus take advantage of the IS function. CIOs also need to understand organizational planning goals and thus recognize appropriate IT opportunities and threats. This interaction makes the CIO believe that the CEO wants to use IT to gain a competitive advantage (Kearns & Lederer, 2000).

Because of different CEO perceptions, considerable diversities exist in how well organizations can assimilate and leverage the business value of IT. Hence, IS success is often affected by CEO commitment. For example, Teo and King (1997) argued that top management support is critical to implement IS strategy and that progressive use of IT depends on top management perception of the IS function. Karake (1997) argued that an increased number of corporate leaders are buying into the idea that IT is critical to the survival and success of their companies as the new decade emerges. Wu (2003) claimed that using IT to rethink business process redesign from a high-level direction (i.e., the CEO) for achieving successful outcomes is significant.

The CIO is expected to act as executive rather than a functional manager and often reports to either the CEO or one of the CEO's direct reports (Chen & Preston, 2007). S/he must establish strong business/IT relationships at the executive level and leverage those relationships to achieve a shared vision of IT. Hence, a strong partnership between CEO and CIO is expected to contribute to IT assimilation. IS success basically reflects such a relationship between top managers and IS managers (Vedder & Guynes, 2002).

To gain an effective relationship, dialogue is needed mostly at the top of the organization. A high frequency of communication between the CEO and the CIO has been shown to improve the linkage by supporting mutual understanding of goals and objectives (Johnson & Lederer, 2005). If there is a communication device (e.g., IS steering committee) in the organization, the likelihood of IS success increases. Moreover. If the CIO has an unlimited or close communication access to the CEO (e.g., direct reporting to senior managers), s/he may find this support equally effective as the CEO participation in top management team (Li & Ye, 1999; Ranganathan & Kannabrian, 2004).

Jones et al. (1995) argued that both CEO and CIO need to agree on the role of IT in the organization, thus ensuring the organization move in a unified direction (Chen & Preston, 2007). Nevertheless, they often disagree on the importance of IT because of lacking shared understanding about the actual organizational impacts from the use of IT (Chang, 2006). Such perceptual differences and lack of communication with top management hinder the CIO efforts on achieving strategic alignment. This poor communication between the CEO and the CIO is found to be the key inhibitor of formalized management of the IS function that supports organizational decision-making (Johnson & Lederer, 2007).

2.2 Strategic Alignment

Strategic alignment is concerned with the degree to which IS and the business mission, objectives, and plans are internally matched and are externally valid as well as the extent of shared vision and commitment between the CEO and the CIO to the congruence of the mission, objectives, and plans (Reich & Benbasat, 1996). Despite its criticism that "too fit" between IS and business strategies may reduce strategic flexibility, researchers have argued that the inability to realize better business value from IT, in part, is due to a mismatch between IS and business strategies (Benco & McFarlan, 2003; Luftman, 2003; Chang, 2006). That is, strategic alignment positively influences IT effectiveness.

Although strategic alignment can be evaluated in terms of alignment of the IS plan with the business plan, alignment of business plan with IS plan, and integration of IS plan with business plan, we focus on "integration" since it generates a more effective deployment of IT for providing business services, thus increasing the contributions of IT (Teo & King, 1997, Kim 2003).

Integration of the IS plan with the business plan refers to the timing of and development of IS plan in relationship to business plan. Pollalis (2003, p. 469) notes: "strategic alignment between business and IT can have a positive organizational impact only if the organization can see IT components as parts of a well-integrated organizational system."

In an integrated environment, IS and business strategy are merged through the incorporation of IT into the business plan to achieve competitive advantage. Such an integration can be depicted by both how the CIO relates to the CEO in planning activities and what type of plans result from their relationship and coordination. The formulation of an IS plan in congruence with business plan may achieve a tight integration between business operations and IT activities to ensure effective top management support (Teo & King, 1997). Moreover, aligning IS and business strategies in order to deliver higher business performance presupposes a strategic business opportunity to which IT is integral (Salmela & Spil 2002; Teo & Ang 2001). As a result, the IS plan should be integrated with organizational resources so as to achieve ultimately matched organization-environment relationship (i.e., effective business strategy).

2.3 IT and Strategic Alignment as a Source of Sustained Competitive Advantage

Companies sustain competitive advantage from their strategies when the resources (e.g., IT) controlled are valuable, rare, inimitable, and non-substitutable (Eisenhardt & Martin 2000). Despite several and immature empirical and theoretical studies on the relation between IT and sustained competitive advantage, the use of the former is treated as a possible source of the latter (Mata, Fuerst & Barney, 1995). This is because IT is deeply embedded in formal and informal planning practices that may be rare and path dependent, and which create socially complex systems (e.g., CEO/CIO relationship or IT management experiences, which are costly to imitate by competitors (Mata, Fuerst, & Barney 1995). Thus, using IT to leverage the core resources of the organization is an important vehicle for competitive advantage. Strategic IS planning processes are also concerned with how organizational resources and IT are combined to generate competitive advantage (Tippins & Sohi, 2003).

Moreover, strategic alignment has been regarded as an important concept for achieving sustained competitive advantage (Venkatramen & Prescott, 1990). To achieve efficient and effective internal coordination or integration under changing business environment, dynamic capability (i.e., the capacity to renew, adapt, integrate, build, and reconfigure internal and external resources) is the ability that managers need to possess. Alignment skill can be treated as dynamic capabilities that create sustained competitive advantage since organizational performance depends on honing internal technological, organizational, and managerial processes (Eisenhardt & Martin 2000).

2.4 Strategic Type of Innovation

"Innovation" may be viewed as a company's adaptation that is a typical business-level strategic orientation (Blumentritt & Danis, 2006). Knott (2003) and O'Brien (2003) noted that innovation and business strategy are intertwined in the efforts to sustain competitive advantage. However, Shoham and Fieganbaum (2002) argued that the need exists for an additional integrated theory to link organizational context with innovation.

We used the Miles and Snow (1978) typology since innovation is one of the principal drivers of prospectors. Miles and Snow typology focuses on the dynamic process of adjusting to environmental changes and uncertainty (Hambrick, 2003; DeSarbo, Benedetto, Song & Sinha, 2005).

Miles and Snow (1978) proposed alternative ways that companies define their product/market domains and construct mechanisms (i.e., organizational structures and processes) to pursue those domains through the adaptive cycle. In this cycle, the three adaptive problems (entrepreneurial, engineering, and administrative) are confronted within each of the four patterns in a company's adaptation (i.e., the strategic type)--defender, prospector, analyser, and reactor--describing various levels of innovativeness pursued to respond to business dynamics (Miles & Snow, 1978).

Each strategic type has a unique configuration of concerns: (1) the domain, related to how a

company orients itself in the market, (2) the technical, referring to the technology and processes used to produce products/services, and (3) the alignment/innovation, embracing how a company attempts to coordinate and implement its strategies.

Prospectors require more sophisticated configuration of IT to handle divergent interests and heterogeneous points of the parties in the value chain (Kearns, 2005; O'Regan & Ghobadian, 2006). They emphasize the strategic alignment through business leadership and choose an IS strategy that allows them to both create and change the market.

Defenders spend less time in environmental scanning since the environment where they operate is more stable and predictable (Hambrick, 2003). A defender strategy could be more effective with mechanistic features such as less user involvement and less motivation (i.e., less innovative) (Govindarajan & Fisher, 1990). Under mechanistic features, a physical structure for the defender usually emphasizes rigid and cost-effective configuration appropriate for strict control and strong efficiency. This is in contrast to prospectors who are externally postured and tend to acquire more computational, analytical, and decisional IT-based resources to scan the uncertain environment for managing complexity effectively (Crichton & Edgar, 1995).

Analysers usually can observe the market avidly and respond very quickly to the changes, since successful imitation is accomplished through high levels of internal and external analysis performed (Shortell & Zajac, 1990). They make strategic choices typical to prospectors in the newer and more dynamic endeavours (e.g., spending more time in IS planning activities) (Gupta, et al., 1997) while adopting a strategy typical to defenders in the traditional and stable business lines.

In the absence of clear strategic orientation, reactors make decisions in a reactive rather than a proactive way (Miles & Snow, 1978). Doty, Glick and Huber (1993) argued that reactors seldom do environmental scanning for long-term forecasting because they believe that the environment will favourably support anything they do or not do. In a sense, reactors will not follow a specific strategy to secure IT-based resources (Desarbo, et al., 2005). IT managers in reactor companies are expected to spend more time in organization-related IT activities than to spend more time in impacting the company's competitive strategy (Matsuno & Mentzer, 2000).

3. RESEARCH HYPOTHESES

Bases on above and subsequent literature review of CEO/CIO relationship, strategic alignment, competitive advantage, and innovation, we proposed two research hypotheses about IT expectation between the CEO and the CIO:

H 1: Perceptual differences on the level of IS-Business integration exist between the CEO and the CIO across strategic types of innovation.

H 2: Perceptual differences on the level of competitive advantage created by IT exist between the CEO and the CIO across strategic types of innovation.

4. METHODOLOGY

Senior business and IS executives in a single company were selected as respondents because they were perceived as the most knowledgeable about the company with regard to the variables of interest (e.g., strategic positioning, internal organization, and IT-based resources and activities) (Gupta, et al., 1997). For ease of discussion, we defined the term *CEO* as the senior business executive with various given titles and the term *CIO* as the senior IS officials with various given titles.

4.1 Measures

Three variables: "innovation", "strategic alignment", and "competitive advantage" were assessed to test our research hypotheses. Since "strategic alignment" is linked to organizational performance (Tippins & Sohi, 2003) and that "competitive advantage" (non-financial) can be its surrogate (Mahmood & Soon, 1991), to validate the perceptual difference between the CEO and CIO regarding "organizational performance", they were match-paired surveyed.

The self-report approach was used to assess the CIO about the company's innovation. The

CIO is up-to-date on the company's direction and may identify intended innovative strategy (Kearns & Lederer, 2000) and has been widely treated as an appropriate method to measure business strategy (Conant, et al., 1990). We adopted short descriptions of the four strategy archetypes in Miles and Snow's (1978) typology (defender, analyser, prospector, and reactor) to assess company's innovative strategic orientation. The respondents were asked to place their companies on a seven-point scale questionnaire that reflects a continuum of products/services innovation..

"Strategic alignment" was assessed by the extent of "integration of IS and business plans" (ITR). Johnston and Carrico's (1988) three stage typology of using IT for competitive advantage were used which are: IS plan supporting operations but not related to business plan, IS plan directly supporting business plan, and IS plan simultaneously integrated with business plan. In order to use the results of the CEO survey to validate those of the CIO survey on this response, two other possibilities: IS plan separately developed from business plan and formal IS plan not existing (Kearns, 1997), were included. The respondents were asked to identify the relationship between IS and business plans by checking the most appropriate statement among five possible outcomes of integration.

Since financial measure of organizational performance has been proofed inadequate (Saunders & Jones, 1992), the use of IT for competitive advantage (i.e., non-financial measure) provides executives the ability to assess their IT organizational impact by using the following variables (Mahmood & Soon 1991; Kearns & Lederer, 2000): unique capability (UCP) (Kettinger, Grover, Subanish & Segar, 1994), strategic direction (SDR) (Saunders & Jones, 1992), entry barriers (ETRY) (Vitale, 1986), consumers and buyers (CSMR) (Brynjolfsson & Hitt, 1996), inter-organization efficiency (IRG) (Bakos & Treacy, 1986), cost advantage (CTA) (Porter, 1985), differentiation advantage (DFA) (Porter, 1985), bargaining power (BGN) (Bakos & Treacy, 1986), and switching costs (SWC) (Bakos & Treacy, 1986).

Although Palvia (1997) developed a 134-item index of competitive advantage, for the general understanding of the CEO outside the IS area, this construct was parsimoniously tailored to 24-item grounded in the past studies (See Table 1 in Appendix A). Respondents used a seven-point Likert scale ("7 = Strongly Agree" to "1 = Strongly Disagree") to record their responses on this construct.

4.2 Sample and Survey Instrument

The sample groups have been regarded as knowledge and information-intensive and use IT within all aspects of management and global implication, which is suitable for this kind of study. *The Year 2002 Largest Corporations in Taiwan-Top 5000* published by the China Credit Information Service, Ltd. (www.credit.com.tw) was used to search for firms. *104 INFO,* a local online job bank (www.104.com.tw) and *Year 2000 Top 1000 Firms in Taiwan* published by "Commonwealth" magazine (www.cw.com.tw) provided the supplemental sources.

After careful screening, 745 non-manufacturing companies representing 38 business sectors qualified for inclusion in the sample after satisfying four requirements (i.e., autonomy in selecting strategies, company size over 250 employees, a structural position [IS manager], and operation over three years). Headquarters of 670 (90%) of these 745 companies were located in metropolitan Taipei; the remaining 75 (10%) companies were located in central Taichung and southern Kaohsiung areas.

The instrument consisted of two match-paired questionnaires: the primary questionnaire for the CIO and the secondary one for the CEO. Besides general demographic questions, the CIO questionnaire contained three main parts for scoring perceived characteristics of innovation, strategic alignment and competitive advantage. The CEO questionnaire emphasized variables (i.e., strategic alignment and competitive advantage) that need to be crossly verified.

The development of the questionnaire involved a series of refinement using IS doctoral students, IS professors, and IS practitioners. Changes in the wordings of certain items to improve clarity and minimize ambiguity were made. The revised Chinese questionnaires were tested with 46 pairs of respondents who were members of the sample and from companies similar to the major industry groupings in the sample. A measure of internal consistency was calculated for each of nine dimensions underlying CA construct, generating an acceptable Cronbach's Alpha value of 0.689~0.999 (Nunnally, 1978) and showing no significant difference from the comments received during the questionnaire refinement.

4.3 Survey Execution and Response Bias

The survey packet contained a questionnaire for the CIO, a questionnaire for the CEO, and introductory letter specifying the purpose of this study that described the benefits available to companies whose employees completed the survey. Based on Kearns and Lederer (2000), to reduce the systematic bias of paired response, the survey packet was forwarded to 745 CIOs via e-mail and airmail. The CIO was asked to complete the primary questionnaire and then direct the secondary one to the CEO who responded privately and ensured the confidentiality of the response by returning the record separately. The two questionnaires were coded with control numbers for matching the returned questionnaires. However, it should be noted that the CIO might select a non-executive (or non-senior) level manager on behalf of the CEO, who may not be available during the survey, and thus generate systematic bias.

Useable questionnaires were returned by 209 CIOs and 141 CEOs. This finding was similar to other IS surveys of CEOs (Jones, et al., 1995). However, good matched-pair surveys only totalled 119, a response rate of 15.97 % (119 of 745 surveys). The type of respondents in this study may account for the low paired response rate (less than 20%) (Kearns & Lederer, 2000; Johnson & Lederer, 2007) because previous research using a matched-pair design with higher paired response rate usually included an IS executive and a user who may or may not have been a senior executive (Gordon & Gordon, 2002; Chang, 2006).

By comparing the CIO response with the CEO response regarding CA construct, it is possible to ascertain the reliability of primary respondent perceptions and reduce the possibility of response bias (Kearns & Lederer, 2000). This was evidenced by a significantly strong correlation between CA_1 (the CIO) and CA_2 (the CEO) (γ =0.184, $p < 0.05$).

4.4 Reliability and Construct Validity of CA Domain

Since the possibility of paired response bias on this construct was low, joint factor analysis of 24 items (i.e., regardless of the number of dimensions) was conducted based on our primary respondent's (the CIO) result to confirm the uni-dimensionality of CA. Items with factor loadings of less than 0.5 on any factor or with factor loadings more than 0.5 on more than one factor were dropped (Hair, Anserson, Tatham & Black, 1998). Except for IRG11, which was dropped because of an unsatisfactory loading of 0.456, 23 items loaded onto 4 varimax rotated factors (See Table 2 in Appendix A).

In Table 2, DFA (9 items) were captured by F1, which measured the aspect of differentiation advantage. F2 contained eight items (UCP11, SDR11, SDR21, CSMR11, CSMR21, BGN11, BGN21, and SWC11), primarily measuring the aspect of unique capability to explore new business opportunities and retain customers, labelled *uniqueness* (UNQ). F3 contained three items (CTA11, CTA21, and CTA31 [CTA41 dropped because of cross loading]), measuring the aspect of having cost efficiency increased because of use of IT, labelled *cost advantage* (CTA). F4 had two items (CTA51 and ETRY11), which were difficult to interpret because the two items were divergent in their intended measurement. To avoid confusion, F4 was not used. Thus, three emergent dimensions, DFA, UNQ, and CTA, were kept for subsequent analyses. The theoretical structure of each individual dimension emerged was confirmed after factor analyses of corresponding multiple items were conducted (R^2 = 0.712 [DFA], 0.689 [UNQ], 0.851 [CTA]) (See Table 3 in Appendix A). The theoretical structure of CA was also confirmed because all emergent dimensions loaded onto a single factor (R^2 = 0.756) (See Table 4 in Appendix A).

5. ANALYSIS AND DISCUSSION

5.1 Sample Characteristics

Almost all participating CIOs were males with a bachelor's or master's degrees and aged 31 to 50 years (mean = 42 year). Similarly, the majority of CEOs were male with a bachelor's or master's degrees and aged 41 years or older (mean = 48 years). Fifty-three percent of CIOs wore the title AVP (assistant vice president) or higher. Thirty-six percentages were managers or senior managers. Thirty-eight percent of CEO respondents held the title CEO or general manager, and 32% held the title VP (vice president), EVP (executive vice president), or SVP (senior vice president). This result suggested that responding executives were familiar with the strategic factors addressed in this survey. More than

60% of participating CIOs and CEOs had acquired considerable work experience in the company (CIO mean = 10 years; CEO mean = 11 years) and within an industry (CIO mean = 16 years; CEO mean = 17 years). Overall, these executives were knowledgeable about their companies and industries. Eighty percent of CIOs were reported as one-step junior to the CEO, suggesting that the relationship between the majority of CIOs and CEOs was more familiar than distant. Thus, Taiwanese CIOs expected to have easy access to shared decision making and assist in selecting innovation strategies, which would not markedly bias the results of this study regarding the use of IT.

The self-report approach yielded the following breakdown of innovative strategic types: 46 defenders, 94 prospectors, 57 analysers, and 12 reactors, supporting our expectation that all four innovative orientation were pursued within non-manufacturing industry of Taiwan context. The distribution of innovative strategic type supports the basic assumptions relating to the existence of significant linkage between innovative strategic type and company type (chi-square = 44.748 [27 df, $p<0.05$, n=209]) and between innovative strategic type and company size (chi-square = 44.497 [9 df, $p<0.05$, n=209]), implying that innovation pursued in different types of business sector or different sizes of company can be successful in a given environment as long as the company acts consistently in business innovation strategy (i.e., strategic alignment). The relationship between innovative strategic type and annual sales was not significant (chi-square = 3.001 [18 df, $p>0.05$, n=203]), indicating that innovation can be competitive (successful) regardless of how much sales can be generated annually. Our result is consistent with studies done in the United States which found that strategic type of financial institutions had a significant relationship with company size and type (e.g., Karimi et al. ([1996); Gupta, et al. (1997)).

5.2 Independent *t* Test

For independent *t* testing, executives were classified into three groups: prospectors, defenders, and analysers. Since reactors have been ignored in the majority of previous studies of the Miles and Snow typology (Hirschheim & Sabherwal, 2001), this type was not included in the subsequent analysis.

To examine how closely executives agree upon the level of strategic alignment (i.e., integration achieved between IS and business plans), the responses of the CIO and the CEO were compared. As shown in Table 5 (Appendix A), only analysers have significant perception differences on ITR between the CIO and the CEO (*t* Value = -1.855, $p<0.05$), implying that there was likely to be a poor communication between both executives. This was expected because analyser strategy is difficult to pursue because it has to always maintain the balance between risk (prospectors) and stability (defenders).

Generally speaking, only prospector CIO reported higher levels of strategic alignment (MD [mean difference]=0.150) than the CEO did although it was not significant, implying that prospectors CIO might be satisfied with the current formal IS planning mechanism because more than 57% of prospector CIOs who viewed their companies as "IS plan based on business plan, and directly support" and "IS plan and business plan developed simultaneously and integrated strategically". This indicates that perhaps they have obtained sufficient top management support and thus can support business effectively, leading to higher levels of reported integration.

However, defender and analyser CIOs might not be satisfied with the current planning process and were likely to receive less top management support, leading to lower level of integration. This can be evidenced by over 40% of defender and analyser CIO responses that perceived their companies as "no formal written IS plan" and "IS plan and business plan developed separately" while less than 20% of prospectors did so. Thus, H1 was generally supported.

We now examine how closely executives agree upon the level of competitive advantage after the use of IT. Based on Table 6 (Appendix A), the prospector CIO reported a significantly higher level of agreement upon the level of DFA (MD = 0.429), CTA (MD = 0.401), and UNQ (MD = 0.374) achieved than the prospector CEO did (*t* Value = 2.893, 2.349, and 2.861 respectively, $p<0.01$ and $p<0.05$), implying that business executives seems have more expectations of IT and are not satisfied with current outcomes after the use of IT (CEO mean scores = 4.912 [DFA], 4.677 [CTA], 4.771 [UNQ], which were less than "5" [mildly agree]). This was expected because prospectors are aggressive in seeking out new market opportunities through highly flexible and multiple technological

innovations, different types of IT investment may often be considered inevitable when pursuing competitive innovation though they may not sustain their strong position through time in all markets they entered.

In a sense, the prospector CIO may have expected to obtain more strong top management support, making s/he intend to report that the whole company has substantially benefited from the use of IT. However, the prospector CEO often plays the role of responsible senior and thus would be more concerned about realized (not intended) IT payoffs when maintaining a good deal of technological flexibility. This perhaps makes the prospector CEO more conservative and careful in evaluating (reporting) the level of competitive advantage achieved after the use of IT for their exploration of new markets.

Another possible explanation for this significant discrepancy may be that there is a lack of appropriate evaluation methods for intangible benefits for the use of IT, making the prospector CEO not able to recognize intangible benefits such as unique capabilities in differentiation, helping strategic direction, retaining and exploring new customers, etc., through the use of IT.

There were no significant mean differences on all aspects of "competitive advantage" between the defender CIO and CEO (t Value = 0.149, -0.387, and -1.602 respectively, $p>0.05$). Despite being non-significant, the defender CEO reported a higher level of agreement on "cost advantage" (MD = -0.109 [CTA]) and "uniqueness" (MD = -0.402 [UNQ]) than the defender CIO did, implying that business executives feel more confident of their IT investments and are satisfied with the current organizational performance after use of IT when pursing competitive innovation. This was expected because defenders rely on a core single technology to maintain their current position in product/service markets, leading to a centralized controlled and conservative (i.e., cost effective) IT investment. This perhaps makes the defender CEO feel more confident in the use of IT and thus report the degree of competitive advantage achieved after the use of IT similar to or higher than the defender CIO did for existing product/service market.

It was also found that the analyser CEO agreement level of all aspects of "competitive advantage" was consistently higher (MD = -0.551 [DFA], -0.007 [CTA], -0.303 [UNQ]). In particular, the level of analyser CEO agreement upon DFA was significant higher than that of the analyser CIO agreement (t Value = -2.559, $p<0.01$). One possible explanation for this finding is that as noted, analyser strategy is very difficult to pursue and those analyser companies currently adopt a defender-like strategy (over 65% of our sample companies using IT is for the purpose of cost reduction and efficiency). It was not surprising that the analyser CEO reported the level of competitive advantage achieved after use of IT similar to or higher than the CIO did due to the same reasoning for the defender CEO mentioned previously. Thus, H2 was generally supported.

6. CONCLUSIONS

To the best of our knowledge, there is a paucity of research examining the divergent perception of IT use between the CEO and the CIO, depending on the level of emphasis on innovation (i.e., the level of environmental adaptation as noted). This study fulfils this gap by incorporating the Miles and Snow (1978) typology into the planning process (i.e., IS-business relationship) to clarify how differently both executives perceive their use of IT for a certain strategic posture of innovation. Our results demonstrate divergent perceptions of "integration of IS and business plan" and "using IT to sustain competitive advantage" across strategic types of innovation.

This study introduces a general notion that higher strategic posture of innovation (e.g., prospectors) tends to have higher CIO satisfaction and lower CEO satisfaction with the IS planning process. It also shows that the CIO tends to be more satisfied with the outcomes after the use of IT when pursuing higher strategic posture, while the CEO tends to be more conservative and careful in evaluating outcomes after the use of IT.

These results generally reflect an IT expectation gap between the CEO and the CIO, providing practical executives implications for facilitating a communication mechanism between the two executives for gaining strong top management support. For example, evaluation methods (e.g., non-financial measures containing management and development criteria [Silk, 1990]) should be used to make the CEO (particularly for prospectors) recognize the intangible benefits of IT investment and

increase their knowledge and confidence in IT. The training and development of the CIO (particularly for defenders) is also suggested by attending workshops on how to influence his or her strategic partners (e.g., CEO and other senior executive members) with respect to IT-based innovation (Enns, Huff & Golden, 2003). As such, practical executives are expected to reduce their expectation gap on IT usage under corresponding contexts of innovation.

To ease the communication, educators also can develop an appropriate IS curriculum that provides IT technicians management programmes (e.g., financial management, project management [strategic planning and implementation], business process management [enterprise architect and business re-engineering process], and customer relationship management). This path of change is expected to train IT technicians more business-oriented and thus have an opportunity of changing their organizational role from an entry technical position to a higher managerial one (the CIO). With such a business sense, the strategic use of IT can be improved. This implies that if the CIO and his or her IT technicians know the business more, they are more likely to know and influence what the CEO actually wants and knows for an IT-based innovation. Having both a satisfied business competent CIO and a satisfied IT competent CEO is essential for a better strategic alignment.

The limitations must also be recognized. The generalizability of results is only limited to non-manufacturing companies with over 250 employees in Taiwan, because the industry and size confounding effects on IT usage were controlled to avoid research bias. Likewise, generalizability of results may be limited due to the low survey response of 15.99%.

Likert-type scales rely on beliefs and attitudes for participant CEOs and CIOs. As such, the measures are subject to each participant's attitudes and beliefs formed by their own unique experiences. This study assumes that the measure of attitude corresponds to the measure of actual behaviour. However, where possible, it would be desirable to replicate the analysis with objective rather than perceptual measures of the strategic use of IT-based resources.

To measure "innovation", a self-typing approach was used. However, as noted by Snow and Hambrick (1980), executives may tend to report their company's intended rather than realized or emergent strategies. If there is no intended strategy, an executive may even create one for the benefit of the researcher. This is a common problem faced in the field of social sciences (Nisbett & Wilson, 1977). Moreover, a lack of external validation of the self-typing approach exists (Karimi, et al., 1996). Because the size and the nature of the sample, external confirmation of the self-typing completed by the CIOs could not be obtained. In a sense, a key assumption was that these individuals had accurate perception of the overall company's competitive position.

In summary, this study extends previous CEO/CIO relationship works (e.g., Jones, et al., 1995). The results highlight that IT expectation between the CEO and CIO would differ depending on their level of innovation, indicating that there should be an effective communication mechanism (i.e., approaches, training, education, etc.) to help the CEO understand IT investment criteria and thus gain confidence when pursuing aggressive innovation, and give the CIO more support in IT-based initiatives when pursing conservative innovation. As a result, a better integration of IS and business plan can be achieved to sustain competitive advantage. Since the CIO is a very difficult role to demonstrate the business value of IT (Gottschalk, 1999), future research may be conducted on whether there have different levels of complexity of CIO role (80% of CIOs reported as one-step junior to the CEO in our sample) depending on the emphasis on the business innovation.

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APPENDIX A: All Tables

Table 1 Measurement of Competitive Advantage created by IT

Variables	Indicants	Variable Name (CIO)	Variable Name (CEO)	Source
Unique Capabilities	Leveraging unique capabilities	UCP11	UCP12	Kettinger, et al. (1994)
Strategic Direction	Enabling existing strategies	SDR11	SDR12	Saunders & Jones (1992); Porter (1985)
	Creating new business strategies	SDR21	SDR22	Same above
Entry Barriers	Creating barriers to entry	ETRY11	ETRY12	Vitale (1986)
Consumers & Buyers	Capturing new customers	CSMR11	CSMR12	Brynjolfsson & Hitt (1996)
	Retaining customers	CSNR21	CSNR22	Same above
Inter-org. efficiency	Using electronic links	IRG11	IRG12	Bakos & Treacy (1986)
Cost Advantage	Lowering cost of material	CTA11	CTA12	Porter (1985)
	- - - - - - - cost of production	CTA21	CTA22	Same above
	- - - - - - - cost of selling and distribution	CTA31	CTA32	Same above
	- - - - - - - cost of personnel	CTA41	CTA42	Same above
	- - - - - - - cost of administration	CTA51	CTA52	Same above
Differentiation Advantage	Determining amount of products/services (P/S)	DFA11	DFA12	Same above
	Specifying characteristics of P/S	DFA21	DFA22	Same above
	Placing orders for P/S needed and checking status of orders	DFA31	DFA32	Same above
	Obtain authority to get P/S	DFA41	DFA42	Same above
	Possessing P/S physically	DFA51	DFA52	Same above
	Monitoring the use of P/S	DFA61	DFA62	Same above
	Upgrading P/S when needed	DFA71	DFA72	Same above
	Repairing and maintaining P/S in good condition	DFA81	DFA82	Same above
	Evaluating usefulness of P/S	DFA91	DFA92	Same above
Bargaining Power	Evaluating various suppliers	BGN11	BGN12	Bakos & Treacy (1986)
	Increasing vertical integration	BGN21	BGN22	Same above
Switching Costs	Giving incentives to continue buying.	SWC11	SWC12	Same above

Table 2 Rotated Component Matrix for CA

Dimension	Item Measuring	F1	F2	F3	F4
Competitive Advantage (CA)	KMO Value: 0.902				
DFA11 (Fg20)	Have increased customers' ability to determine amount of product/ service	0.664			
DFA21 (Fg21)	Have increased customers' ability to specify characteristics of p/s needed.	0.702			
DFA31 (Fg22)	Have increased customers' ability to place an order and check the status of their order.	0.687			
DFA41 (Fg23)	Have increased customers' ability to obtain authority to get p/ s needed	0.784			
DFA51 (Fg24)	Have increased customers' ability to possess p/s physically.	0.738			
DFA61 (Fg25)	Have increased customers' ability to monitor the use of p/s needed	0.785			
DFA71 (Fg26)	Have increased customers' ability to upgrade p/s when necessary.	0.837			
DFA81 (Fg27)	Have increased customers' ability to repair and maintain p/s in good conditions.	0.814			
DFA91 (Fg28)	Have increased customers' ability to evaluate usefulness of p/s	0.810			
CTA11 (Ff14)	Have reduced costs of receiving, storing, and moving input materials.			0.811	
CTA21 (Ff15)	Have reduced costs of transforming input materials into final p/s			0.822	
CTA31 (Ff16)	Have reduced costs of selling and distributing p/s			0.766	
CTA41 (Ff17)	Have reduced costs of recruiting, training, and developing personnel			(0.520)	(0.683)
CTA51 (Ff18)	Have reduced costs of general administration (e.g., planning, finance, etc).				0.630
UCP11 (Fc18)	Have leveraged unique capabilities throughout the organization		0.750		
SDR11 (Fb4)	Have enabled existing strategies		0.804		
SDR21 (Fb5)	Have created new business strategies		0.780		
IRG11 (Fe12)	Have established electronic links with suppliers and customers	Drop			
ETRY11 (Fc7)	Have increased the level of financial investment to compete in our industry.				0.517
CSMR11 (Fd9)	Have increased our ability to capture new customers.		0.721		
CSMR21 (Fd10)	Have increased our ability to retain customers.		0.733		

Note 1: The letters and numbers in parenthesis indicate the questionnaire item number
Note 2: only factor loadings greater than 0.5 are shown. Those items not shown were dropped.
Note 3: The loading in parenthesis indicate cross loading items that were dropped.

Table 2 Rotated Component Matrix for CA (Cont.)

Dimension	Item Measuring	F1	F2	F3	F4
Competitive Advantage (CA)	KMO Value: 0.902				
BGN11 (Fh30)	Have increased our ability to evaluate various suppliers		0.594		
BGN21 (Fh31)	Have increased our ability to perform activities currently carried out by suppliers or customers.		0.606		
SWC11 (Fi33)	Have given our customers greater incentives to continue buying from us		0.688		
Eigenvalues		12.996	2.416	1.379	1.002
Cumulative % Variance Explained		26.226	49.641	63.546	74.139

Note 1: The letters and numbers in parenthesis indicate the questionnaire item number
Note 2: only factor loadings greater than 0.5 are shown. Those items not shown were dropped.
Note 3: The loading in parenthesis indicate cross loading items that were dropped.

Table 3 Theoretical Structure Confirmation of Dimension Emerged

Dimension	Unidimensionality	# of Factor Loaded	Cumulative % Variance Explained	# of Item Drop	# of Item Remain
DFA(9)	Confirmed	1	71.192	0	9
UNQ(8)	Confirmed	1	68.856	0	8
CTA(3)	Confirmed	1	85.092	0	3

Note: Numbers in parenthesis indicate the number of questionnaire items.

Table 4 Theoretical Structure Confirmation of CA

Construct	Unidimensionality	# of Factor Loaded	Cumulative % Variance Explained	# of Dimension	# of Dimension Remain
CA	Confirmed	1	75.603	3	3: DFA(0.849) UNQ(0.897) CTA(0.862)

Note: Numbers in parenthesis indicate factor loadings.

Table 5 Independent *t* Test of Integration of IS and Business Plan: CIO vs. CEO by Strategy Type

Integration of IS-Business Strategy	Defenders		Analyzers		Prospectors	
	CIO Response	CEO Response	CIO Response	CEO Response	CIO Response	CEO Response
No formal written IS plan	28.3%	10.5%	26.3%	18.8%	9.6%	6.8%
IS and business plan developed separately	15.2%	15.8%	15.8%	6.3%	8.5%	16.9%
IS plan based on business plan, but not related	26.1%	21.1%	21.1%	25.0%	24.5%	33.9%
IS plan based on business plan, and directly supported	17.4%	36.8%	29.8%	25.0%	46.8%	28.8%
IS pan and business plan developed simultaneously and integrated strategically	13.0%	15.8%	7.0%	25.0%	10.6%	13.6%
	MD	*t* –Value	MD	*t* -Value	MD	*t* -Value
Overall Integration of IS-Business Plan	-0.598 (2.717 vs. 3.316)	-1.621	-0.558 (2.754 vs. 3.313)	-1.855*	0.150 (3.404 vs. 3.254)	0.819

* Significant at 0.05 level

Note: MD=mean difference, numbers in the parentheses indicate CIO mean score versus CEO mean score for the degree of IS-business strategy integration.

Table 6 Independent *t* Test of Using IT to Sustain Competitive Advantage: CIO vs. CEO by Strategic Type

	Defenders				Analyzers				Prospectors			
CA	CIO Mean (SD)	CEO Mean (SD)	MD	*t*-Value	CIO Mean (SD)	CEO Mean (SD)	MD	*t*-Value	CIO Mean (SD)	CEO Mean (SD)	MD	*t*-Value
DFA	5.157 (0.858)	5.123 (0.786)	0.003	0.149	4.696 (0.900)	5.247 (1.097)	-0.551	-2.559**	5.341 (0.681)	4.912 (1.003)	0.429	2.893**
CTA	4.732 (1.086)	4.842 (0.899)	-0.109	-0.387	4.737 (1.029)	4.812 (1.077)	-0.007	-0.322	5.078 (1.013)	4.677 (1.049)	0.401	2.349*
UNQ	4.785 (1.001)	5.187 (0.673)	-0.402	-1.602	4.614 (0.993)	4.917 (1.116)	-0.303	-1.321	5.237 (0.707)	4.771 (1.119)	0.374	2.861**

** Significant at 0.01 level, * Significant at 0.05 level

Note: SD=standard deviation, MD=mean difference