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Abstract

How to create competitive advantage through information technology (IT) in the turbulent environment is an important issue to most organizations. This study contributes to the information systems (IS) literatures by help gaining a greater understanding of whether and how IT skills that an IT department possesses influence the firm's IT capabilities and IT-business alignment. This study proposes a theoretical model to investigate how soft skills and hard skills of the IT department influence a firm's IT capabilities, and how these IT capabilities in turn affect its IT-business alignment. The study identifies three IT capabilities related to the IS development context: IT-user collaboration, IT adaptability, and IT innovativeness. The empirical data collected from 120 IT directors showed that both soft IT skills and hard IT skills positively affect the three IT capabilities simultaneously, IT adaptability and IT-user collaboration significantly affect the IT-business alignment, and IT-user collaboration has significant effect on IT adaptability. Yet the result failed to support the role of IT innovativeness in facilitating IT-business alignment, nor the effect of IT-user collaboration on IT innovativeness. Our findings confirm the importance of IT-related resources and capabilities possessed by the IT department. The implications and limitations of this study are provided.

Keywords: IT skills, IT capabilities, IT-business alignment.

1 INTRODUCTION

In the turbulent business environment, the average period for which a firm can sustain competitive advantage has been decreasing over time (Wiggins & Ruefli 2005). In order to respond to the multiple market demands rapidly and flexibly, IT has become one of the major factors in shaping firm competitiveness (Byrd & Turner 2001; Sambamurthy et al. 2003), making IT capabilities critical to contemporary firms both strategically and operationally (Bharadwaj 2000). For IT capabilities, this study focuses on the related dynamic capabilities with regard to IS development. If IS development plans can be adjusted and tightly linked to business strategy, IT will become a source of competitive advantage in the changing environment (Brancheau et al. 1996; Galliers et al. 1994; Reich & Benbasat 2000). How to develop the required IT capabilities depends heavily on the abilities of the entire IT department personnel (or developers). In addition to the technical expertise related to IS development (called *hard skills*), how to communicate with users and work with them to solve IT related problems are also important. These non-technical skills are called *soft skills*. In recent years, a considerable concern has arisen regarding the importance of soft skills. Many companies have recognized that it would be helpful for creating competitive advantage if employees have not only hard skills but soft skills as well (Bailey & Stefaniak 2001; Skulmoski & Hartman 2010; Stevenson & Starkweather 2010). Consequently, our research question is *whether and how IT skills that an IT department possesses influence the firm's IT capabilities and IT-business alignment?* The first objective of this study is to explore what kinds of skills that an IT department possesses are helpful in developing IT capabilities for achieving a better alignment between IT and business strategy (called *IT-business alignment*). The study identifies three IS development related IT capabilities: IT-user collaboration, IT adaptability and IT innovativeness. The second objective then is to examine how these IT capabilities can help achieving greater IT-business alignment. Accordingly, this study proposed a theoretical model and conducted an empirical investigation to examine the relationships among IT skills, IT capabilities, and IT-business alignment. We argue that firms with better IT skills (soft/hard skills) and IT capabilities can achieve a higher level of IT-business alignment, thus leading to greater competitiveness.

This study contributes to the IS literature in three ways. First, soft/hard skills are widely discussed in various areas (Bailey & Stefaniak 2001; Skulmoski & Hartman 2010; Stevenson & Starkweather 2010), but relevant discussions in the IS development domain are rare. Second, the level of analysis regarding soft/hard skills in prior studies was mainly at the individual level (Skulmoski & Hartman 2010; Stevenson & Starkweather 2010). We still know very little about the effects of the soft/hard skills possessed by a unit or a department, especially in the IS context. This study recognizes the soft/hard skills at the organizational level and explores their effects on IT capabilities and IT-business alignment of the firm. Third, we thus propose a theoretical model to examine the issues and our empirical results may serve as the foundation for future related research. For practitioners, this study clarifies the roles IT resources play in leading to a better alignment between IT and business strategy, informing executives how and why IT human capitals are critical in dealing with the increasingly volatile business environment.

2 CONCEPTUAL BACKGROUND AND HYPOTHESES

2.1 Resourced-based view (RBV) and IT skills

The resource-based view (RBV) of the firm proposes that if a firm possesses specific and valuable resources, the resources will be a source of sustained competitive advantage (Barney 1991; Teece et al. 1997; Wernerfelt 1984). IT-related skills of a firm, especially the skills possessed by the IT personnel, can be viewed as such specific resources. If IT personnel have adequate IT skills, they can use these skills to improve or adjust IS applications efficiently and effectively (Byrd & Turner 2001; Sambamurthy et al. 2003). Traditionally, the skills that IT personnel possess can be classified into two types: hard skills and soft skills. Kim et al. (2011) describe IT expertise skills as "professional skills and knowledge of technologies, technology management, business functions, and relational (or

interpersonal) areas necessary for IT staff to undertake assigned tasks effectively" (p. 492). Hard skills are related to the technical abilities of IT personnel based on their expertise in specific technical areas, and these abilities can advance the development or configuration of IS or IT-related services (Armstrong & Sambamurthy 1999; Fink & Neumann 2007; Mata et al. 1995). In contrast, soft skills are human assets relevant to the business knowledge and interpersonal skills. In order to develop IT-applications that satisfy user demands, IT personnel must have the abilities to communicate with users and understand the tasks of other functions in addition to their technical skills (Feeny & Willcocks 1998). This study classifies IT-related skills possessed by the IT department into soft skills and hard skills. *Soft skills* are defined as the set of abilities to communicate and solve problems with users effectively. The four critical soft skills examined in the study are: (1) *shared language* is defined as the extent to which IT department personnel can use common language to communicate with users; (2) *acquiring new technical skills* is defined as the extent to which IT department personnel can acquire new knowledge or skills for solving IT related problems; (3) *business knowledge* is defined as the extent to which IT department personnel understand the business and functions of their firms; and (4) *interpersonal skills* are defined as the extent to which IT department personnel have the ability to communicate or socialize well with users. *Hard skills* in this study are defined as the set of extant technical expertises in IT, consisting of technical capability and infrastructure capability (Kim et al. 2011). *Technical capability* is defined as the extent to which IT department personnel have the technical abilities to program or develop applications. *Infrastructure capability* refers to ability of IT management, defined as the extent to which IT department personnel have the technical abilities to manage and provide firm-wide IT related services. This study operationalizes soft skills and hard skills, respectively, as a second-order construct reflected by its first-order dimensions (see Appendix A).

2.2 Dynamic capabilities perspective (DCP) and IT capabilities

The RBV assumes that if a firm possesses valuable resources and these resources are best utilized, the firm can then obtain competitive advantage (Barney 1991). However, the RBV does not explain what mechanisms associated with these specific resources are and how they may help the firm achieve sustained competitive advantage (Melville et al. 2004). RBV emphasizes resource picking, whereas dynamic capabilities stress resource renewal (Makadok, 2001). From the RBV, we can only understand the roles IT skills play in producing competitive advantage when these IT skills can be viewed as the static resources an IT department possesses. The dynamic capabilities perspective (DCP), however, clarifies that mechanisms are needed to reconfigure and integrate the extant resources to sustain competitive advantage in the dynamic environment. Teece et al. (1997) define *dynamic capabilities* as "the firm's ability to integrate, build, and reconfigure internal and external resources to address rapidly changing environments" (p. 516). In the IS development context, in order to respond to user requests fast or be well aligned with business strategies, the IT personnel must have the capabilities to reconfigure or construct IT-related services flexibly and effectively. Mithas et al. (2011) define IT capabilities as the "ability to mobilize and deploy IT-based resources in combination or co-present with other resources and capabilities" (p. 492). This study identifies three such IT capabilities in the IS development context: IT adaptability, IT innovativeness, and IT-user collaboration.

2.2.1 IT skills and IT adaptability

This study defines *IT adaptability* as the ability to apply a broad range of IT resources to respond to changed requests and meet user expectations rapidly. IT adaptability is related to the reconfiguration of the extant IS or IT applications according to the changed requirements. However, if IT personnel do not understnag the relevant business or user tasks, or they cannot communicate effectively with the users, it is possible that the IT personnel may not fully understand what the users want or what adjustments are needed, making the adjusted IT applications fail to meet users' needs (Feeny & Willcocks 1998). Accordingly, the soft skills of IT personnel play an important role in making IS applications adaptable to new demands. Hence, we propose the following hypothesis:

H1a: Soft skills are positively associated with IT adaptability.

In the rapidly changing environments, many organizations expect to maintain their business strategies flexibly through IT. Consequently, IT assets or resources must keep the flexibility to adjust according to the multiple, varying requests (Tallon 2008). However, how to reconfigure extant IT resources effectively often relies on the specific technical expertise of the IT personnel (Fink & Neumann 2007). If IT personnel have solid hard skills, they can speed up the development or reconstruction of IS or IT-related services. Hence, we propose the following hypothesis:

H2a: Hard skills are positively associated with IT adaptability.

2.2.2 IT skills and IT innovativeness

This study defines *IT innovativeness* as the ability to use IT to generate new or improved applications aimed at increasing the competitiveness of the firm. The objective of the IT innovativeness is to create IT values or to acquire more profits (Danneels 2002). Undoubtedly, IT personnel have to understanding how to develop innovative IT to help users or other functions improving the effectiveness of their tasks and enhancing their performance. Thus, IT personnel should have a comprehensive understanding of other functions and how they work (Kim et al. 2011). In addition, IT innovations often involves new techniques that are difficult for non-IT background employees to understand (Gemünden et al. 2005; Henderson & Clark 1990). IT personnel must have the ability to use shared language to communicate with the users, mitigating users' fear when they use new IT applications or apply processes enabled by the new technology (Kim et al. 2011). Hence, we propose the following hypothesis:

H1b: Soft skills are positively associated with IT innovativeness.

Kock et al. (2011) indicated that technological innovativeness is a driver of new product success because new technologies promise higher technical performance and offer additional functionality and increased benefits to customers (Garcia & Calantone 2002; Zhou et al. 2005). Technological innovativeness of a new application is highly inconceivable if it is based on technological principles that require a new knowledge base, if the architecture of a technological system is changed fundamentally (Henderson & Clark 1990), or if completely new components and materials are used (Gemünden et al. 2005). Consequently, if IT personnel do not have sufficient current new, advanced technical expertise, they will not be able to construct new IT applications to solve users' problems innovatively. Hence, we propose the following hypothesis:

H2b: Hard skills are positively associated with IT innovativeness.

2.2.3 IT skills and IT-user collaboration

To develop new IT applications, IT departments must confirm the requirements of the target functions (Srivastava et al. 1998), making the collaboration between IT personnel and users critical (Kahn 1996). Kahn (1996) defined collaboration as "an affective, volitional, mutually/shared process where two or more departments work together, have mutual understanding, have a common vision, share resources, and achieve collective goals" (p. 139). Collaboration emphasizes the harmonious, collaborative nature of interdepartmental relationships (Atuahene-Gima 2005; Olson et al. 1995; Ruekert & Walker 1987). This study defines *IT-user collaboration* as the extent to which IT personnel and users have built their relationship through formal mechanisms and informal means. In the IS development process, if IT personnel possess better interpersonal skills so as to interact closely with users, or can communicate with common language to understand the tasks of users, the relationship building capability of the IT personnel is advanced (Kim et al. 2011; Schrage 1990). Such capability of course should make users more willing to collaborate with IT personnel, thus leading to better IT-user collaboration. Hence, we propose the following hypothesis:

H1c: Soft skills are positively associated with IT-user collaboration.

2.2.4 IT-user collaboration and IT adaptability and IT innovativeness

Development of new IT-related applications often requires cross-functional collaboration (Lovelace et al. 2001; Luca & Atuahene-Gima 2007). If IT department and other functions are willing to

communicate with each other and have a closer collaborative relationship, this will not only help IT personnel fully understand the user requirements but also mitigate the difficulty of transition when the adjustment required by a new application or a reconfigured system is significant, since the affected users may be less likely to resist the change. Therefore, the collaboration between IT personnel and users are important when the firm has to adjust their current systems or implement new applications. Hence, we propose the following hypotheses:

H3a: IT-user collaboration is positively associated with IT adaptability.

H3b: IT-user collaboration is positively associated with IT innovativeness.

2.3 Dynamic capabilities perspective (DCP) and IT-business alignment

From the DCP, IT-business alignment can be viewed as a firm-specific dynamic capability (Chan & Reich 2007; Schwarz et al. 2010). If the IT strategy (or plans) and business strategy (or plans) of a firm can be closely aligned, the firm will have the potential to achieve greater performance (Schwarz et al. 2010). This study defines *IT-business alignment* as the extent to which the IT missions, objectives and plans support and are supported by the business missions, objectives, and plans. In the rapidly changing environment, if firms possess the IT capabilities to reconfigure IT resources flexibly according to market requirements or business strategy, the alignment between IT strategy and business strategy should be more easily achieved and maintained. IT-business alignment can impact firm performance at two levels: strategic and operational (Schwarz et al. 2010). Therefore, this study operationalizes IT-business alignment as a second-order construct reflected by its two first-order dimensions: (1) operational support (defined as the extent to which IT can support the daily routines effectively), and (2) strategic decision support (defined as the extent to which IT strategy and business strategy are tightly linked) (see Appendix A).

2.3.1 IT capabilities and IT-business alignment

Peppard et al. (2000) pointed out that firms can achieve IS alignment by mobilizing resources through IS competencies. Ross et al. (1996) argued that besides a strong partnership between a firm's IT and its business units, a reusable technology base also influences the firm's ability to deploy IT for strategic objectives. With IT adaptability, changes in business strategy can be communicated to IT executives, and then IT executives can adjust their IT resources and modify current applications to support changed business strategy. With IT innovativeness, firms are more willing and have the ability to use new technologies for meeting changed business strategies. Thus, we hold that both IT adaptability and IT innovativeness should facilitate a firm to achieve and maintain a higher level of IT-business alignment and thus propose the following hypotheses:

H4: IT adaptability is positively associated with IT-business alignment.

H5: IT innovativeness is positively associated with IT-business alignment.

Communication leads to mutual understanding or alignment. Boynton et al. (1994) suggested that the effective application of IT depends on the interactions and exchanges that bind IT and line managers together. Such information sharing over time leads the individuals to converge or diverge from each other in their mutual understanding of a certain topic. Rockart et al. (1996) suggested that communication ensures that business and IT capabilities are integrated into the business effectively. Ross et al. (1996) argued that a strong partnership between a firm's IT and its business units influence the firm's ability to deploy IT for strategic objectives. With the effective communication and a harmonious working relationship under a collaborative environment, firms should be able to better align their IT strategies with business strategies. Hence, we propose the following hypothesis:

H6: IT-user collaboration is positively associated with IT-business alignment.

Based on the resource-based view and the dynamic capability perspective, this study developed a theoretical model based on the hypotheses proposed above. The model intends to examine how IT skills of the IT department influence the firm's IT capabilities, and how these IT capabilities in turn impact its IT-business alignment. The model is depicted in Figure 1.

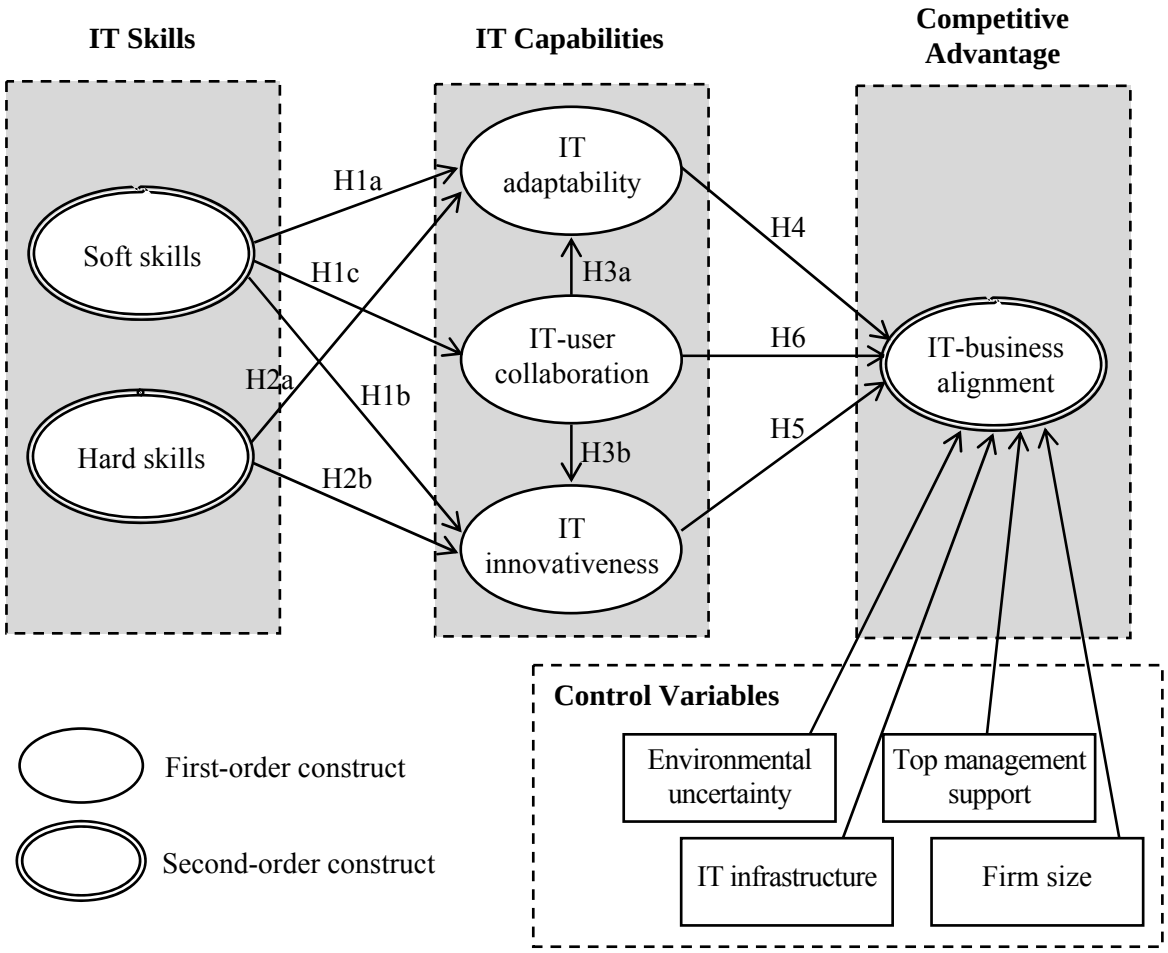

Figure 1. Research model

3 RESEARCH METHOD

3.1 Instrument development and data collection

The survey instrument was developed based on existing measures and then adapted to the current study. After compiling an English version of the questionnaire, the measures were translated into Chinese. The Chinese version of the draft questionnaire was pretested with one MIS professor and two senior doctoral students to verify the phrasing and clarity of the items for translation accuracy. Five IT department managers in the manufacturing industry were interviewed to examine the measures for content validity. The final questionnaire was modified and refined based on their suggestions. A mail survey was administrated to collect data from large and medium-sized manufacturing firms in Taiwan. One thousand survey packages were mailed to the IT directors of the firms from the list of 2010 Taiwan's Top 1000 manufactures issued by China Credit Information Service Ltd. In total, 162 surveys were returned with 42 invalid ones (two incomplete and 40 responded by IT staff who were considered insufficiently knowledgeable to answer the survey), resulting in 120 valid responses for subsequent analysis and an effective response rate of 12%. Table 1 presents the sample profile. All respondents were IT executives (5.83%) or IT managers (94.17%). On average, the respondents had 10.51 years (S.D. = 7.20) in their current firm and 5.71 years (S.D. = 4.69) in their present position. This showed that all respondents should be sufficiently knowledgeable to answer our survey. In addition, the sample firms had on average 729 employees (S.D. = 864.17) and had 7.54 billion NTD (S.D. = 10.46) annual sales. This showed that the sample firms were

representative of our targeted large to medium-sized manufacturing firms in Taiwan. Non-response bias was assessed by verifying that early and late respondents did not significantly differ in their demographic characteristics (Armstrong & Overton 1977). The respondents were divided into two groups based on the dates of return. Early respondents were those who responded in the first three weeks (n = 60). The comparisons on annual sales and number of employees between the two groups showed no significant differences based on the independent sample *t*-test (p = .15 and .43, respectively). Accordingly, non-response bias should not be a serious concern for our survey.

Profile of respondent		
Demographic Variables	n	%
Title		
IT Executive	7	5.83
IT Manager	113	94.17
Tenure in current firm (Mean = 10.51; S.D. = 7.20)		
0-5 years	35	29.17
6-10 years	40	33.33
11-15 years	16	13.33
Above 16 years	29	24.17
Tenure in current position (Mean = 5.71; S.D. = 4.69)		
0-5 years	73	60.83
6-10 years	31	25.83
11-15 years	11	9.17
Above 16 years	5	4.17

Profile of responding firm		
Demographic Variables	n	%
Number of employees (Mean = 729.13; S.D. = 864.17)		
Less than 100	9	7.50
101-500	61	50.83
501-1,000	24	20.00
1,001-3,000	21	17.50
Above 3,000	5	4.17
Annual sales (in billion NTD) (Mean = 7.54; S.D. = 10.46)		
Less than 2	24	20.00
2-3	27	22.50
3-5	26	21.67
Above 5	43	35.83

Table 1. Sample profile (n = 120)

3.2 Measures

The research constructs were operationalized using multi-item reflective indicators with a seven-point Likert-type scale. Consistent with our theoretical conceptualization, soft skill, hard skill, and IT-business alignment were modelled as second-order constructs reflected by their interrelated first-order dimensions. Further, this study included four control variables, (1) environment uncertainty (defined as the extent to which the changing speed of the firm's industry environment), (2) IT infrastructure (defined as the extent to which IT infrastructure services the firm can provide), (3) top management support (defined as the extent to which top managers of the firm are involved and willing to invest resources in IT), and (4) firm size (defined as the number of employees and annual sales of the firm), to control the potential confounding effect on the IT-business alignment. Measurement items of this study are presented in Appendix A.

4 RESULTS

In this study, data was analyzed using a two-step structural equation modelling (SEM) technique. Partial Least Squares (PLS), specifically SmartPLS 2.0 M3, was used to assess the reliability and validity of the measures in the first step (the measurement model), and then estimate the structural relationships among the constructs in the second step (the structural model). The significance of the relationships were checked with *t* values generated by bootstrapping with 5000 re-samples (Chin & Newsted 1999).

4.1 Measurement validation

4.1.1 Examination of second-order constructs

Before assessing the reliability and validity of the measurement model, we assessed the appropriateness of the three second-order constructs, soft skills, hard skills, and IT-business alignment, respectively (see Table 2). All composite reliabilities and Cronbach's alpha values were greater than 0.7 (Fornell & Larcker 1981), indicating acceptable reliability. All loadings of the measurement items were above 0.7 as recommended by Chin (1998), indicating acceptable convergent validity. The AVE illustrates the amount of variances the items share with the construct. All AVE values were above the recommended threshold 0.5 (Fornell & Larcker 1981), providing additional evidence of convergent validity. Further, the reliability and AVE values of each higher-level construct were all above the acceptable level. The results showed that all of the three second-order constructs were well reflected by their underlying first-order dimensions. Together, we concluded that it is appropriate to treat soft skills, hard skills, and IT-business alignment as second-order constructs in the subsequent analysis.

Second-order construct	First-order construct	Loading	Items	Range of item loading	Cronbach's alpha		Composite reliability		AVE		t-value
Soft skills	Shared language	0.836	3	0.787-0915	0.844	0.943	0.906	0.951	0.764	0.620	26.103***
	Acquiring new technical skills	0.884	3	0.855-0.904	0.858		0.913		0.778		36.292***
	Business knowledge	0.927	3	0.883-0.903	0.871		0.921		0.795		62.637***
	Interpersonal skills	0.907	3	0.855-0.918	0.876		0.924		0.802		51.008***
Hard skills	Technical capability	0.906	3	0.798-0.878	0.795	0.853	0.880	0.891	0.710	0.576	45.528***
	Infrastructure capability	0.903	3	0.803-0.854	0.786		0.875		0.701		39.093***
IT-business alignment	Operational support	0.903	3	0.868-0.942	0.905	0.943	0.941	0.954	0.841	0.748	40.837***
	Strategic decision support	0.952	4	0.904-0.956	0.953		0.966		0.877		89.015***

Note: *** p < .001; ** p < .01; * p < .05; Bootstrapping results (n = 5000)

Table 2. Assessment of second-order constructs

4.1.2 Measurement model

Reliability, convergent validity, and discriminant validity were examined to evaluate the appropriateness of the overall measurement model. Except for three items (ITA-ITA1, 0.64; EU-EU1, 0.37; FS-FS2, 0.68), most loadings of the measurement items are above 0.7, indicating acceptable convergent validity[1]. Table 3 presents the correlations and the reliability values of the constructs. The results showed that, except for two control variables, i.e., environmental uncertainty and firm size, almost all composite reliability and Cronbach's alpha values were greater than the acceptable threshold 0.7 (Fornell & Larcker 1981). All AVEs (except environmental uncertainty) of the construct were greater than the threshold 0.5 (Fornell & Larcker 1981), providing additional evidence of convergent validity. Discriminant validity was confirmed by two ways. First, almost all item loadings

[1] Due to the limited page space, we did not include the table of cross loadings among measurement items.

of their assigned construct were greater than their cross loadings with other constructs, indicating suitable discriminant validity. Moreover, the square roots of all AVEs were greater than the correlations between a focal construct and the other constructs, indicating that all the constructs share more variances with their indicators than with those of other constructs. Overall, the self-report measurement instrument exhibited sufficiently strong psychometric properties to support our subsequent test of the proposed structural model.

Construct	Items	Mean	S.D.	Composite reliability	Cronbach's alpha	AVE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Shared language	3	5.01	1.07	0.91	0.84	0.76	**0.87**														
2. Acquiring new technical skills	3	5.27	1.09	0.91	0.86	0.78	0.59	**0.88**													
3. Business knowledge	3	5.07	1.04	0.92	0.87	0.79	0.69	0.82	**0.89**												
4. Interpersonal skills	3	4.95	1.16	0.92	0.88	0.80	0.72	0.73	0.77	**0.90**											
5. Technical capability	3	4.18	1.16	0.88	0.79	0.71	0.46	0.53	0.49	0.43	**0.84**										
6. Infrastructure capability	3	4.50	1.11	0.88	0.79	0.70	0.48	0.68	0.63	0.60	0.64	**0.84**									
7. IT adaptability	5	4.83	1.05	0.90	0.86	0.65	0.59	0.56	0.61	0.63	0.56	0.60	**0.81**								
8. IT innovativeness	6	4.50	1.14	0.95	0.93	0.75	0.61	0.65	0.63	0.63	0.55	0.66	0.81	**0.87**							
9. IT-user collaboration	3	5.32	0.95	0.92	0.87	0.79	0.65	0.70	0.67	0.76	0.45	0.58	0.64	0.61	**0.89**						
10. Operational support	3	5.52	1.08	0.94	0.90	0.84	0.59	0.63	0.65	0.63	0.60	0.63	0.73	0.66	0.66	**0.92**					
11. Strategic decision support	4	5.30	1.12	0.97	0.95	0.88	0.57	0.65	0.71	0.60	0.42	0.56	0.67	0.66	0.66	0.73	**0.94**				
12. Environmental uncertainty	3	3.88	1.03	0.70	*0.49*	*0.45*	0.40	0.42	0.44	0.34	0.32	0.31	0.38	0.46	0.39	0.36	0.42	**0.67**			
13. IT infrastructure	3	4.28	1.28	0.85	0.75	0.65	0.40	0.27	0.26	0.34	0.35	0.39	0.50	0.50	0.41	0.39	0.32	0.17	**0.81**		
14. Top management support	3	4.56	1.41	0.95	0.91	0.85	0.51	0.61	0.58	0.61	0.43	0.59	0.61	0.67	0.65	0.54	0.58	0.24	0.32	**0.92**	
15. Firm size	2	2.05	0.87	0.82	*0.68*	0.71	0.12	0.09	0.03	0.08	0.25	0.14	0.31	0.26	0.20	0.30	0.22	0.19	0.16	0.15	**0.84**

Note: The numbers on the diagonal are the square roots of the average variances extracted (AVEs).

Table 3. Confirmatory factor analysis: Correlation and reliability of latent constructs

4.2 Tests of common method variance and survey data

We conducted Harman's *post hoc* single-factor analysis to examine for method bias in our single-source self-report data. If common method variance (CMV) is a serious issue, a factor analysis would generate a single factor accounting for most of the variance (Podsakoff et al. 2003). The diagnostic analysis indicated that all the 15 constructs accounted for 44.43% of the variance, which is below the threshold 50%, suggesting that CMV should not be a serious concern with regard to our data.

4.3 Hypotheses tests

The structural model was assessed by the significance level of the path coefficients of the model. Bootstrapping with 5000 re-samples was performed. The results showed that most of our hypotheses were supported by the empirical data, except that two hypotheses, H3b ($b = .117$, $p > .05$) and H5 ($b = .177$, $p > .05$), failed to be significant (see Figure 2). As for the explained variances (R square value), the results showed that IT skills explained 55.1% of the variances in IT adaptability, 57.4% of the variances in IT innovativeness, and 61.2% of the variances in IT-user collaboration, respectively. Furthermore, the three IT capabilities accounted for 67.1% of the variances in IT-business alignment. None of the four control variables showed any significant effect, indicating that control variables

would not confound the explanation of the dependent variable (IT-business alignment). The summary of the hypothesis testing results is presented in Table 4.

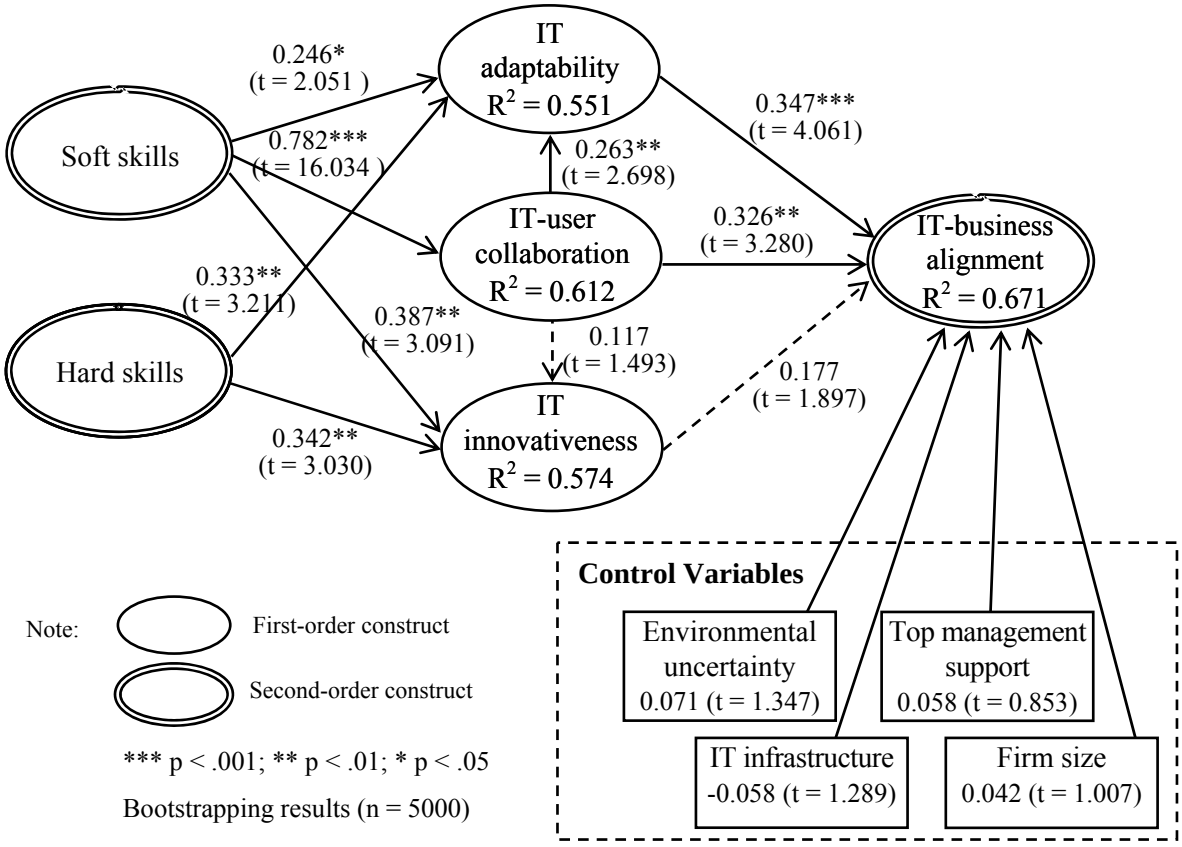

Figure 2. PLS results for research model

Hypothesis	Relations	Predicted Sign	Results
H1a	Soft skills → IT adaptability	+	Supported
H1b	Soft skills → IT innovativeness	+	Supported
H1c	Soft skills → IT-user collaboration	+	Supported
H2a	Hard skills → IT adaptability	+	Supported
H2b	Hard skills → IT innovativeness	+	Supported
H3a	IT-user collaboration → IT adaptability	+	Supported
H3b	IT-user collaboration → IT innovatieness	+	**Not supported**
H4	IT adaptability → IT-business alignment	+	Supported
H5	IT innovativeness → IT-business alignment	+	**Not supported**
H6	IT-user collaboration → IT-business alignment	+	Supported

Table 4. Summary of hypotheses testing

5 DISCUSSION

Among the ten proposed hypotheses, eight (except H3b, H5) are supported by the data. The first objective of this study is to explore what kinds of skills that an IT department possesses are helpful in developing the IT capabilities of the firm. The results show that both soft skills and hard skills of the IT department are important in developing the IT capabilities. When IT department has better soft

skills, they are able to communicate with users more effectively and capture their needs more quickly. Moreover, IT department with solid hard skills can adjust or develop new applications timely in order to cope with users' varying needs. Consequently, firms with both better soft skills and hard skills can enhance their IT capabilities. The second objective is to examine how these IT capabilities can create competitive advantage through achieving a better alignment between IT and business strategy. The results show that IT adaptability and IT-user collaboration can positively enhance IT-business alignment, and IT-user collaboration can positively influence IT adaptability.

Our empirical results provide several key findings. First, the results show that soft skills have strong impact on IT-user collaboration. It does make sense because communication and shared language can help IT personnel working with users more harmoniously (Kim et al. 2011). Second, IT-user collaboration has significant effect on IT adaptability, but not on IT innovativeness. A possible explanation of the insignificant result is that innovative IT is new to both IT personnel and users, a good collaborative relationship between IT personnel and the users, though helpful, is less important as both parties need time to know how the new IT can be applied effectively. Further, innovative IT may rely on top management support. Without top management support for investing additional resources the IT department may not have the sufficient resources to adopt new technology or create new IT applications. Hence, only well collaboration between IT department and users may not be sufficient to apply innovative IT in their business. Adaptability, on the other hand, typically involves the adjustment of current systems, which both the IT personnel and users are familiar with. A collaborative relationship thus enables the IT personnel to convince users that the adjustment is beneficial to them and mitigate their reluctance to accept the adjusted systems (Lovelace et al. 2001; Luca & Atuahene-Gima 2007). Finally, IT innovativeness has no significant effect on IT-business alignment. The possible reason is that innovative IT may be not necessary for maintaining IT-business alignment, even though it may help. Thus, the capability regarding adjusting the extant applications quickly and flexibly in accordance with the changed business strategy is more crucial to achieve the better alignment between IT and business.

5.1 Implications for research and practice

In order to develop IT-related applications successfully, solid IT technical skills should be the critical resources of IT departments. In addition to these hard skills, considerable concern has arisen on the importance of soft skills (Bailey & Stefaniak 2001; Skulmoski & Hartman 2010; Stevenson & Starkweather 2010). This study shows that if IT department has both soft skills and hard skills, these IT-related skills will enhance the IS development capabilities of the firm. Our empirical study could be a foundation for future research to further explore the importance of soft/hard skills in other contexts. Second, prior researches targeted at soft/hard skills are mainly at the individual level (Bailey & Stefaniak 2001; Skulmoski & Hartman 2010; Stevenson & Starkweather 2010). Our study extends soft/hard skills from the individual level to the firm level in order to clarify their effects on the IT related capabilities of the firm. The findings could be an initial understanding with regard to the importance of these skills in an organization. Finally, through the proposed theoretical model, we show that soft/hard skills can help firm achieve IT-business alignment through the enhanced IT capabilities. This implies that when IT department possesses strong soft/hard skills, they are able to obtain more opportunities to meet their business requirements. However, the synergy of soft skills and hard skills are still unclear. We suggest that researchers can further explore the effect of the interactions between soft skills and hard skills.

For practitioners, in the changing IT rapidly advanced environment, it is critical for IT executives to know how to make the best use of available IT resources to help their firm create the competitive advantage. The foundation of the advantage may lie on the ability of IT to support business strategies. According to our results, IT executives and managers must to know what soft skills and hard skills that the IT department possesses and how to apply these IT-related skills to enhance the IT capabilities of their firm. Second, traditionally, firms often hire an IT employee based on his/her technical expertise or experience. This of course ignores the importance of soft skills that the employee possesses. Although it is difficult recognize whether a person has sufficient soft skills in the initial recruiting meetings, practitioners still must try their best to identify the right man who owns

both required hard skills and sufficient soft skills. Third, our results show that IT adaptability significantly influences IT-business alignment but IT innovativeness does not. This suggests that applications or systems that can be adjusted or reconfigured flexibly and quickly are more important than those applying newest technologies. Finally, a recent study conducted by Luftman (2005) found that strategic alignment of IS with the business is the top concern of CIOs. Boynton et al. (1992) found that incongruent language hinders a common view between business managers and IS managers. Social interaction and participation in social events are the principal means by which employees become socialized in their organization, learn to speak the language of their company, and gain a better appreciation of its values and mission (Feldman 1984). This implies that IT executives must strengthen their IT professionals' soft skills. With better soft skills, IT personnel not only can be more effective in improving their relationship with users or other business functions, but also can further enhance the alignment between IT and business strategy.

5.2 Limitations

Our study has several limitations. First, we used cross-sectional data to infer the causality. However, the study is based on the theoretical arguments, so the risk of inferring causality is acceptable. Second, the sample of this study is 120 manufacturing firms in Taiwan, which is relatively small and may be specific to Taiwan's industry environment, and thus may not be generalizable to other industries or countries. Future research can use a larger sample size or collect data from other industries or countries to test the generalizability of our results. Finally, measures of this study are adapted from prior studies, these scales may still need further development.

6 CONCLUSIONS

In this study, we proposed a theoretical model to understand whether and how IT skills that an IT department possesses influence the firm's IT capabilities and thereby IT-business alignment. We conducted an empirical study and found that soft skills and hard skills that an IT department possesses are critical in developing the firm's IT capabilities. Capabilities such as IT adaptability and IT-user collaboration can help a firm achieve a better alignment between IT and business strategy, which then may lead to the competitive advantage that the firm expected from investing IT.

APPENDIX A: MEASUREMENT SCALES

Scales	References
Soft skills-Shared language 1 = "strongly disagree"; 7 = "strongly agree" *SSSL1* IT staff and users share a common language in our conversations. *SSSL2* IT staff primarily use business terminology when interacting with user. *SSSL3* IT staff avoid using IS jargon when interacting with users.	Adapted from Preston and Karahanna (2009); Reich and Benbasat (2000)
Soft skills-Acquiring new technical skills 1 = "strongly disagree"; 7 = "strongly agree" *SSATS1* IT staff closely follow the trends in current IT. *SSATS2* Our firm has a plan for IT staff to acquire skills continually on new IT. *SSATS3* Our firm encourages IT staff to learn new IT.	Adapted from Bharadwaj (2000); Ross et al. (1996)
Soft skills-Business knowledge 1 = "strongly disagree"; 7 = "strongly agree" *SSBK1* IT staff are capable in interpreting business problems and developing appropriate technical solutions. *SSBK2* IT staff understand our firm's policies and plans at a high level. *SSBK3* IT staff are knowledgeable about business functions.	Adapted from Byrd and Turner (2000)
Soft skills-Interpersonal skills 1 = "strongly disagree"; 7 = "strongly agree" *SSIS1* IT staff socialize with the user (e.g., play golf, go mountain climbing). *SSIS2* IT staff are good at communicating with people at different levels of our firm (e.g., with superiors, peers, subordinates). *SSIS3* IT staff work well in cross functional teams addressing business problems.	Adapted from Bassellier and Benbasat (2004); Preston and Karahanna (2009)
Hard skills-Technical capability 1 = "strongly disagree"; 7 = "strongly agree" *HSTC1* IT staff are skilled in multiple programming languages. *HSTC2* IT staff are skilled in developing Web-based applications. *HSTC3* IT staff are skilled in data warehousing, mining, or marts.	Adapted from Fink and Neumann (2007); Lee et al. (1995)

Scales	References
Hard skills-Infrastructure capability 1 = "strongly disagree"; 7 = "strongly agree" *HSIC1* IT staff provide a wide range of data management services (e.g., knowledge management). *HSIC2* IT staff provide a wide range of application infrastructure services (e.g., mobile and wireless applications). *HSIC3* IT staff provide a wide range of IT facilities management services (e.g., mainframe).	Adapted from Fink and Neumann (2007); Weill and Vitale (2002)
IT adaptability 1 = "strongly disagree"; 7 = "strongly agree" *ITA1* Our information systems encourage users to challenge outmoded traditions/practices. *ITA2* Our information systems are flexible enough to allow us to respond quickly to changes in our market. *ITA3* Our information systems evolve rapidly in response to shifts in our business priorities. *ITA4* IT department immediately takes corrective action when users are unhappy with the quality of information systems. *ITA5* IT department makes immediate modifications to information systems to accommodate changing user needs.	Adapted from Thongpapanl et al. (2012); Weigelt and Sarkar (2012)
IT innovativeness 1 = "strongly disagree"; 7 = "strongly agree" *ITI1* Our firm applies a new information technological principle to develop new information systems. *ITI2* Our firm uses IT that enables a leap in technical performance (e.g., implementation efficiency). *ITI3* IT innovation in our firm is faster than competitors. *ITI4* Our information systems address a completely new user benefit. *ITI5* Our information systems serve new user needs. *ITI6* Steps in the value chain become obsolete or are being fundamentally changed by our information systems.	Adapted from Brettel et al. (2011); Kock et al. (2011); Talke et al. (2011)
IT-user collaboration 1 = "strongly disagree"; 7 = "strongly agree" *ITUC1* IT department and user departments carry out their respective responsibilities and commitments. *ITUC2* The relationship between IT department and user departments is satisfying. *ITUC3* IT department and user departments consider that it is worthwhile to spend time and effort on developing and maintaining a relationship with each other.	Adapted from De Clercq et al. (2011)
IT-business alignment-Operational support 1 = "strongly disagree"; 7 = "strongly agree" *AOS1* Our information systems improve the efficiency of our day-to-day business operations. *AOS2* Our information systems support the coordination across functions and product lines effectively. *AOS3* Our information systems enable the users to perform detailed analyses of present business situations.	Adapted from Chan et al. (2006)
IT-business alignment- Strategic decision support 1 = "strongly disagree"; 7 = "strongly agree" *ASDS1* The information systems strategy is congruent with the corporate business strategy in our firm. *ASDS2* Decisions in information systems planning are tightly linked to the organization's strategic plan in our firm. *ASDS3* Our business strategy and information systems strategy are closely aligned. *ASDS4* Our information systems facilitate strategic business planning.	Adapted from Preston and Karahanna (2009)
Control variables	
Environment uncertainty 1 = "strongly disagree"; 7 = "strongly agree" *EU1* Products and services in our industry become obsolete very quickly. *EU2* The product/services technologies in our industry change very quickly. *EU3* We can predict when our products/services demand changes.	Adapted from Newkirk and Lederer (2006)
IT infrastructure 1 = "strongly disagree"; 7 = "strongly agree" *ITI1* Our firm utilizes open systems network mechanisms to boost connectivity. *ITI2* The product/services technologies in our industry change very quickly. *ITI3* Our firm easily adapts to various vendors' database management systems (DBMS) protocols and standards.	Adapted from Fink and Neumann (2009)
Top Management Support 1 = "strongly disagree"; 7 = "strongly agree" *TMS1* Top management ensures adequate funding of IT research and development. *TMS2* The top management supports best practices in using IT. *TMS3* Top management restructures work processes to leverage IT opportunities in our firm.	Adapted from Byrd and Davidson, (2003); Elie-Dit-Cosaque et al. (2011)
Demographic characteristics of the respondent and responding firm *FS1* Number of employee in the IT department of your firm: _____ *FS2* Annual sales of your firm: _____(NTD) 3. Your formal title:_____ 4. Your tenure in the current firm: _____ year(s) 5. Your tenure in the current position: _____ year(s)	

References

Armstrong, C.P. and Sambamurthy, V. (1999). Information technology assimilation in firms: The influence of senior leadership and IT infrastructures. Information systems research, 10(4), 304-327.

Armstrong, J.S. and Overton, T.S. (1977). Estimating nonresponse bias in mail surveys. Journal of Marketing Research, 14, 396-402.

Atuahene-Gima, K. (2005). Resolving the capability: Rigidity paradox in new product innovation. Journal of Marketing, 69(4), 61-83.

Bailey, J.L. and Stefaniak, G. (2001). Industry perceptions of the knowledge, skills, and abilities needed by computer programmers. In Proceedings of the 2001 ACM SIGCPR Conference on Computer Personnel Research (Serva, M. Ed.), pp. 93-99, San Diego, CA, USA.

Barney, J. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17(1), 99-120.

Bassellier, G. and Benbasat, I. (2004). Business competence of information technology professionals: Conceptual development and influence on IT-business partnerships. MIS Quarterly, 28(4), 673-694.

Bharadwaj, A.S. (2000). A resource-based perspective on information technology capability and firm performance: An empirical investigation. MIS Quarterly, 24(1), 169-196.

Boynton, A.C., Jacobs, G.C. and Zmud, R.W. (1992). Whose responsibility is IT management. Sloan Management Review, 33(4), 32-38.

Boynton, A.C., Zmud, R.W. and Jacobs, G.C. (1994). The influence of IT management practice on IT use in large organizations. MIS Quarterly, 18(3), 299-318.

Brancheau, J.C., Janz, B.D. and Wetherbe, J.C. (1996). Key issues in information systems management: 1994-95 SIM delphi results. MIS Quarterly, 20(2), 225-242.

Brettel, M., Heinemann, F., Engelen, A. and Neubauer, S. (2011). Cross-functional integration of R&D, marketing, and manufacturing in radical and incremental product innovations and its effects on project effectiveness and efficiency. Journal of Product Innovation Management, 28(2), 251-269.

Byrd, T.A. and Davidson, N.W. (2003). Examining possible antecedents of IT impact on the supply chain and its effect on firm performance. Information & Management, 41(2), 243-255.

Byrd, T.A. and Turner, D.E. (2000). Measuring the flexibility of information technology infrastructure: Exploratory analysis of a construct. Journal of Management Information Systems, 17(1), 167-208.

Byrd, T.A. and Turner, D.E. (2001). An exploratory examination of the relationship between flexible IT infrastructure and competitive advantage. Information & Management, 39(1), 41-52.

Chan, Y.E. and Reich, B.H. (2007). IT alignment: What have we learned? Journal of Information Technology, 22(4), 297-315.

Chan, Y.E., Sabherwal, R. and Thatcher, J.B. (2006). Antecedents and outcomes of strategic IS alignment: An empirical investigation. IEEE Transactions on Engineering Management, 53(1), 27-47.

Chin, W.W. (1998). The partial least squares approach to structural equation modelling. In G. A. Marcoulides (Ed.), Modern Methods for Business Research (pp. 295-336). Mahwah, NJ: Lawrence Erlbaum.

Chin, W.W. and Newsted, P.R. (1999). Structural equation modeling analysis with small samples using partial least squares. In R. H. Hoyle (Ed.), Statistical strategies for small sample research (pp. 307-341). Thousand Oaks, CA: Sage Publications.

Danneels, E. (2002). The dynamics of product innovation and firm competences. Strategic Management Journal, 23(12), 1095-1121.

De Clercq, D., Thongpapanl, N.T. and Dimov, D. (2011). A closer look at cross-functional collaboration and product innovativeness: contingency effects of structural and relational context. Journal of Product Innovation Management, 28(5), 680-697.

Elie-Dit-Cosaque, C., Pallud, J. and Kalika, M. (2011). The influence of individual, contextual, and social factors on perceived behavioral control of information technology: A field theory approach. Journal of Management Information Systems, 28(3), 201-234.

Feeny, D.F. and Willcocks, L.P. (1998). Core IS capabilities for exploiting information technology. Sloan Management Review, 39(3), 9-21.

Feldman, D.C. (1984). The development and enforcement of group norms. Academy of Management Review, 9(1), 47-53.
Fink, L. and Neumann, S. (2007). Gaining agility through IT personnel capabilities: The mediating role of IT infrastructure capabilities. Journal of the Association of Information Systems, 8(8), 440-462.
Fink, L. and Neumann, S. (2009). Exploring the perceived business value of the flexibility enabled by information technology infrastructure. Information & Management, 46(2), 90-99.
Fornell, C. and Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39-50.
Galliers, R.D., Merali, Y. and Spearing, L. (1994). Coping with information technology? How British executives perceive the key information systems management issues in the mid-1990s. Journal of Information Technology, 9(3), 223-238.
Garcia, R. and Calantone, R. (2002). A critical look at technological innovation typology and innovativeness terminology: A literature review. Journal of Product Innovation Management, 19(2), 110-132.
Gemünden, H.G., Salomo, S. and Krieger, A. (2005). The influence of project autonomy on project success. International Journal of Project Management, 23(5), 366-373.
Henderson, R.M. and Clark, K.B. (1990). Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms. Administrative Science Quarterly, 35(1), 9-30.
Kahn, K.B. (1996). Interdepartmental integration: a definition with implications for product development performance. Journal of Product Innovation Management, 13(2), 137-151.
Kim, G., Shin, B., Kim, K.K. and Lee, H.G. (2011). IT capabilities, process-oriented dynamic capabilities, and firm financial performance. Journal of the Association for Information Systems, 12(7), 487-517.
Kock, A., Gemunden, H.G., Salomo, S. and Schultz, C. (2011). The mixed blessings of technological innovativeness for the commercial success of new products. Journal of Product Innovation Management, 28(s1), 28-43.
Lee, D.M.S., Trauth, E.M. and Farwell, D. (1995). Critical skills and knowledge requirements of IS professionals: A joint academic/industry investigation. Mis Quarterly, 19(3), 313-340.
Lovelace, K., Shapiro, D.L. and Weingart, L.R. (2001). Maximizing cross-functional new product teams' innovativeness and constraint adherence: A conflict communications perspective. Academy of Management Journal, 44(4), 779-793.
Luca, L.M.D. and Atuahene-Gima, K. (2007). Market knowledge dimensions and cross-functional collaboration: Examining the different routes to product innovation performance. Journal of Marketing, 71(1), 95-112.
Luftman, J. (2005). Key issues for IT executives 2004. MIS Quarterly Executive, 4(2), 269-285.
Makadok, R. (2001). Toward a synthesis of the resource-based and dynamic-capability views of rent creation. Strategic Management Journal, 22(5), 387-401.
Mata, F.J., Fuerst, W.L. and Barney, J.B. (1995). Information technology and sustained competitive advantage: A resource-based analysis. MIS Quarterly, 19(4), 487-505.
Melville, N., Kraemer, K. and Gurbaxani, V. (2004). Information technology and organizational performance: An integrative model of IT business value, MIS Quarterly, 28(2), 283-322.
Mithas, S., Ramasubbu, N. and Sambamurthy, V. (2011). How information management capability influences firm performance. MIS Quarterly, 35(1), 237-256.
Newkirk, H.E. and Lederer, A.L. (2006). The effectiveness of strategic information systems planning under environmental uncertainty. Information & Management, 43(4), 481-501.
Olson, E.M., Walker, O.C., Jr. and Ruekert, R.W. (1995). Organizing for effective new product development: The moderating role of product innovativeness. Journal of Marketing, 59(1), 48-62.
Peppard, J., Lambert, R. and Edwards, C. (2000). Whose job is it anyway? Organizational information competencies for value creation. Information Systems Journal, 10(4), 291-322.
Podsakoff, P.M., MacKenzie, S.M., Lee, J. and Podsakoff, N.P. (2003). Common method variance in behavioral research: A critical review of the literature and recommended remedies. Journal of Applied Psychology, 88(5), 879-903.

Preston, D.S. and Karahanna, E. (2009). Antecedents of IS strategic alignment: A nomological network. Information Systems Research, 20(2), 159-179.
Reich, B.H. and Benbasat, I. (2000). Factors that influence the social dimension of alignment between business and information technology objectives. MIS Quarterly, 24(1), 81-113.
Rockart, J.F., Earl, M.J. and Ross, J.W. (1996). Eight imperatives for the new IT organization. Sloan Management Review, 38(1), 43-55.
Ross, J.W., Beath, C.M. and Goodhue, D.L. (1996). Develop long-term competitiveness through IT assets. Sloan Management Review, 38(1), 31-42.
Ruekert, R.W. and Walker, O.C., Jr. (1987). Marketing's interaction with other functional units: A conceptual framework and empirical evidence. Journal of Marketing, 51(1), 1-19.
Sambamurthy, V., Bharadwaj, A. and Grover, V. (2003). Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms. MIS Quarterly, 27(2), 237-263.
Schrage, M. (1990). Shared minds: The new technologies of collaboration. New York: Random House.
Schwarz, A., Kalika, M., Kefi, H. and Schwarz, C. (2010). A dynamic capabilities approach to understanding the impact of IT-enabled businesses processes and IT-business alignment on the strategic and operational performance of the firm. Communications of the Association for Information Systems, 26, 57-84.
Skulmoski, G.J. and Hartman, F.T. (2010). Information systems project manager soft competencies: A project-phase investigation. Project Management Journal, 41(1), 61-80.
Srivastava, R.K., Shervani, T.A. and Fahey, L. (1998). Market-based assets and shareholder value: A framework for analysis. Journal of Marketing, 62(1), 2-18.
Stevenson, D.H. and Starkweather, J.A. (2010). PM critical competency index: IT execs prefer soft skills. International Journal of Project Management, 28(7), 663-671.
Talke, K., Salomo, S. and Kock, A. (2011). Top management team diversity and strategic innovation orientation: The relationship and consequences for innovativeness and performance. Journal of Product Innovation Management, 28(6), 819-832.
Tallon, P.P. (2008). Inside the adaptive enterprise: An information technology capabilities perspective on business process agility. Information Technology and Management, 9(1), 21-36.
Teece, D.J., Pisano, G. and Shuen, A. (1997). Dynamic capabilities and strategic management. Strategic Management Journal, 18(7), 509-533.
Thongpapanl, N., De Clercq, D. and Dimov, D. (2012). An investigation of the performance consequences of alignment and adaptability: Contingency effects of decision autonomy and shared responsibility. R &D Management, 42(1), 14-30.
Weigelt, C. and Sarkar, M. (2012). Performance implications of outsourcing for technological innovations: Managing the efficiency and adaptability trade-off. Strategic Management Journal, 33(2), 189-216.
Weill, P. and Vitale, M. (2002). What IT infrastructure capabilities are needed to implement e-business models. MIS Quarterly Executive, 1(1), 17-34.
Wernerfelt, B. (1984). A resource-based view of the firm. Strategic Management Journal, 5(2), 171-180.
Wiggins, R.R. and Ruefli, T.W. (2005). Schumpeter's ghost: Is hypercompetition making the best of times shorter? Strategic Management Journal, 26(10), 887-911.
Zhou, K.Z., Kin, C. and Tse, D.K. (2005). The effects of strategic orientations on technology-and market-based breakthrough innovations. *Journal of Marketing*, 69(2), 42-60.