

A Comparison of Information Technology Capability, Employee Empowerment and Innovativeness in German and Polish Firms*

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The paper investigates the relationships between information technology capability, employee empowerment, innovativeness, and firm performance in German firms. Results of the investigation are compared to a previous study of Polish firms. The same questionnaire was used in both studies, and found that the factors influencing innovation activity are similar in German and Polish firms, but there are significant differences in those influencing firm performance. The disparate results of the Polish and German studies may be explained by their differences in economic development and culture.

Keywords: IT capability, employee empowerment, innovativeness, firm performance, Germany, Poland
JEL Codes: L20, M10, O30)

Introduction

Many empirical studies investigating whether higher levels of information technology (IT) capability are related to better firm performance and innovation have produced equivocal results (Sabherwal/Jeyaraj 2015). Recently, Chae, Koh, and Prybutok (2014) suggested that IT capability no longer offers a clearly discernible competitive advantage. Sabherwal and Jeyaraj (2015) claimed that the business value of IT ultimately depends on the degree of economic development of the country. In consequence, this issue merits a comparison of these relationships in two neighbouring countries that are at different economic development stages. Two examples are Germany and Poland. Germany is highly developed with a national market economy that is the largest in Europe. In Poland, until 1989, there was a socialist economy, which was based on state ownership and administrative planning. In 1989, along with the transformation of the political system, Poland began to transform to a market economy. Fifteen years later, Poland became a member of the European Union (EU), which has boosted economic development with access to European funding, and enabled closer busi-

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ness collaboration with other EU members, including Germany. However, there is still a huge difference between Germany and Poland in terms of welfare. In 2014, the gross domestic product (GDP) per capita in Germany was US\$47,773, whereas in Poland the GDP per capita was US\$14,411 (International Monetary Fund 2016). Moreover, various business-related indexes show significant differences between Germany and Poland. For example, according to the World Bank Group (2016), Germany has a higher Ease of Doing Business rank (15) than Poland (25). Further, according to the Summary Innovation Index, Germany is outperforming Poland (European Commission 2016). Germany is an innovation leader whereas Poland is a moderate innovator. In 2015, the share of small and medium-sized enterprises (SMEs) innovating in-house in Germany was 39 percent, whereas in Poland this share was only 10 percent. The share of innovative SMEs collaborating with others in Germany was 11.5 percent, whereas in Poland this share was 4 percent (European Commission 2016). Beside economic differences between Germany and Poland, there are also sociological differences. In comparison to Germany, Poland has higher preference for avoiding uncertainty, is a more hierarchical society, and is more normative than pragmatic (Hofstede 2016: Poland with comparison country Germany). Innovation may be resisted in countries exhibiting high uncertainty avoidance and where centralization is popular.

The objective of this paper is to interpret differences regarding the relationships between IT capability, innovativeness, employee empowerment and firm performance in German and Polish firms. To achieve this, we conducted empirical research among German and Polish firms using the same questionnaire. Research on Polish SMEs was conducted in 2010 and published in 2012, while that on German firms was conducted in 2015.

This paper is structured as follows: we present a literature review as a background for discussion of the IT relationships, and the moderating effect of IT capability. In the subsequent section, we describe our methodology. In the final section, we present and discuss our results.

Literature Review

IT Capability and Firm Performance

For managers who are expected to make rational decisions (see Meczynska/Kmieciak/Michna/Flajsok 2013), including IT investment decisions, it is important to know whether and how IT influences firm performance. The relationship between IT and firm performance is explained using the resource-based view (RBV) proposed by Wernerfelt (1984). According to the RBV, the competitive advantage of a firm is determined by a bundle of valuable resources owned by the firm. However, as Barney (1991) noted, these resources must be not only valuable, but also rare, imperfectly imitable, and non-substitutable in order to

generate sustained competitive advantage. From this view, IT may be perceived as an organizational resource that can increase and strengthen other organizational resources and capabilities and, consequently, improve performance (Bharadwaj/Bharadwaj/Bendoly 2007; Liang/You/Liu 2010). Moreover, the literature generally claims that different IT-related resources combine to form a unique capability called IT capability (Pavlou/El Sawy 2006). IT capability has been defined as a firm's ability to leverage its IT-based resources in combination with other organizational resources and capabilities in order to achieve its business objectives (Bharadwaj 2000). Consistent with RBV theory, an IT capability that presents the characteristics of rarity, appropriability, inimitability, and non-substitutability may lead to higher performance (Wade/Hulland 2004). IT capability supports knowledge management and business processes within a firm in order to facilitate the realization of economies of scope, enhance productivity, increase profitability, reduce inventory and operational costs, improve competitive advantage, and other measures of firm performance (see Panda/Rath 2015).

Researchers have identified various dimensions of IT capability. For example, Bharadwaj, Sambamurthy, and Zmud (1999) defined IT capability as an enterprise-wide dynamic capability reflected by six constructs: IT business partnerships, external IT linkages, business IT strategic thinking, IT business process integration, IT management, and IT infrastructure. According to Ross, Beath, and Goodhue (1996), IT capability depends on the status of three key assets: IT human resource, a reusable technology base, and a strong partnering relationship between IT and business management. Tippins and Sohi (2003) stated that IT competency, defined as the extent to which a firm is knowledgeable about and effectively utilizes IT to manage information within the firm, consists of three components: IT knowledge, IT operations, and IT objects.

In the present study we have accepted the definition of IT proposed by Bharadwaj (2000). Moreover, in accordance with previous research, we view IT capability as a second-order construct that consists of three dimensions: IT knowledge, integration of IT with business strategy, and IT in internal communications (Kmiecik/Michna/Męczyńska 2012). Hereby, we focused our research effort on IT knowledge and utilization that supports various business functions, rather than on infrastructure or investments.

Many studies have examined the link between IT capability and firm performance (for a useful review, see Sabherwal/Jeyaraj 2015). Bharadwaj (2000) found that large firms with superior IT capability (IT leaders) demonstrated better firm performance than their counterparts. However, a more recent study shows no significant link between IT capability and firm performance; moreover, IT capabilities that made a significant difference in the 1990s have not done so in the 2000s (Chae et al. 2014). A possible explanation is that IT superi-

ority has been eroded by universalization or commoditization. Since IT has become an increasingly standardized, affordable, ubiquitous, and competitive necessity, capabilities no longer offer a discernible advantage (Chae et al. 2014).

The results of the study conducted on Polish SMEs (Kmieciak et al. 2012) indicated that only IT knowledge is significantly positively related to firm performance. Previous studies have made investigated whether the business value of IT may depend on the degree of regional economic development. Sabherwal and Jeyaraj (2015) suggested that the business value of IT may be lower in developing economic regions compared to already-developed ones, and argued that firms from different countries may differ in their abilities to recognize, exploit, and internalize new technologies. They also may differ in their degrees of access to external financial resources and skilled IT labour. Accordingly, relationships between IT capability and firm performance may be stronger in German firms than in Polish firms. On this basis, we offer the following hypothesis:

H1. IT capability has a positive effect on the firm performance of German firms.

IT Capability, Innovativeness and Employee Empowerment

Firm innovativeness is conceptualized as its propensity to change and adopt innovations (see Garcia/Calantone 2002; Nawrocki/Jonek-Kowalska 2016). Innovation is defined as the implementation of a new or significantly improved product, process, or organizational or marketing method (OECD/Eurostat 2005). Innovativeness “appears to embody some kind of measurement contingent on an organization’s proclivity towards innovation” (Salavou 2004:33) and is often perceived as a measure of the degree of “newness” of an innovation (Garcia/Calantone 2002). Following the definition by Lumpkin and Dess (1996), we define innovativeness as “a firm’s tendency to engage in and support new ideas, novelty, experimentation, and creative processes that may result in new products, services, or technological processes” (p. 142).

Researchers have investigated whether IT is a key determinant of innovativeness. It has been claimed that IT has improved the speed and efficiency of firm innovation through the management of knowledge assets, production support, and interorganizational coordination (see Kleis/Chwelos/Ramirez/Cockburn 2012). For example, communication and database applications enable knowledge sharing between research centres. Moreover, IT facilitates the design and testing of new products (see Marinkovic/Levijaksic 2011).

IT capability can offer information that is required for innovation activities. For a firm to be innovative it must quickly scan data, sense information about market trends, and respond to opportunities. In order to increase the success of product innovation, firms can use IT to collect data from various channels and ex-

tract information about customers' needs and preferences. IT makes it possible to analyse these data and information and then disseminate them among various functional departments and business processes, including R&D (Chen/Wang/Nevo/Benitez-Amado/Kou 2015). IT can shorten the time required to convert customers' needs into new products and, in this way, can help increase a firm's innovativeness.

It is widely recognized that knowledge sharing is an important determinant of a firm's innovativeness (Lin 2007; Gunu/Ajayi, 2015). As Liua and Phillips (2011) noted, successful introduction of innovation requires cooperation between individuals and the combining of their knowledge and skills, because usually no single individual can carry out all the activities necessary to produce innovations. IT capability in a firm can facilitate and support communication and knowledge sharing among employees and functional departments, as well as between the firm and its business partners. Enabled by IT, better communication and collaboration inside and outside the firm help to innovate more effectively. IT capability can facilitate networking and access to the relevant data. Moreover, IT capability can improve a firm's ability to quickly and accurately allocate resources to new initiatives and tasks, such as collaborative product development, cycle time improvement, and cross-functional processes (Chen et al. 2015).

However, the results of empirical studies on the relationships between IT and innovativeness have been equivocal (see Dibrell/Davis/Craig 2008; Huang/Li/Chen 2009; Li/Merenda/Venkatachalam 2009). Some scholars claim that IT has an indirect impact on innovativeness. Many mediating factors in the IT–innovativeness link have been investigated, such as: dynamic capabilities, innovation-supportive culture, organizational structures, and organizational virtues (see Chatterjee/Moody/Lowry/Chakraborty/Hardin 2015). Chatterjee et al. (2015) claimed that “IT affordances positively influence organizational virtues, which then influence organizational improvisational capabilities, thus improving organizational innovation” (p. 159). In the study of Polish SMEs, only one of the three IT capability dimensions, that is, IT in internal communications, was significantly positively related to innovation activity (Kmiecik et al. 2012). Therefore, we state a second and general hypothesis as follows:

H2 a. IT capability is positively related to innovativeness in German firms.

Employee empowerment is a multi-faceted management approach that may be defined as “a management practice of sharing information, rewards, and power with employees so that they can take initiative and make decisions to solve problems and improve service and performance” (Narmadha 2015:384). Studies suggest that greater empowerment leads to employees' greater work motivation and job satisfaction (Honold 1997). It is believed that empowered employees are more committed, eager to share ideas, proactive and willing to embrace change

than non-empowered employees (Narmadha 2015). Moreover, empowered employees are supposed to work “smarter” and perform better by seeking out new and better ways of doing things (Fernandez/Moldogaziev 2013).

By empowering employees, managers give them the autonomy or freedom to change existing practices and reconfigure them in new ways. Moreover, they encourage empowered employees to innovate by imparting a sense of control and responsibility for the quality of their work and by raising one's level of confidence that the employee will not be called out or punished for failed innovations (Fernandez/Moldogaziev 2013).

As Çekmecelioğlu and Özbağ (2016:24) argued, “when an employee perceives that his or her job requirements are meaningful and personally valuable, s./he can increase his or her creative activities by willingly spending time and effort necessary to thoroughly identify a problem, search for extensive information, and generate multiple ideas from different perspectives”. Moreover, employee creativity, through idea generation and implementation, is likely to have a positive relationship with the development of innovative products and firm innovation (Sarooghi/Libaers/Burkemper 2015; Liu/Gong/Zhou/Huang 2016).

Some empirical studies confirmed that employee empowerment has significant effects on employees, which in turn increases firm innovativeness (Knight-Turvey 2006; Çakar/Ertürk 2010; Celik/Iraz/Cakici/Celik 2014). Based on a sample of Turkish manufacturing firms, Çekmecelioğlu and Özbağ (2016) found that three of the four psychological empowerment components (meaning, competence, and impact) are significantly and positively related to individual creativity; surprisingly, individual creativity is not correlated with firm innovativeness. A study of Polish SMEs did not find a clear and direct relation between employee empowerment and innovation activity (Kmieciak et al. 2012). However, this finding may be explained in terms of cultural characteristics of Polish sample. In Poland, cultural values are relatively high in power distance (Hofstede 2016). In a high-power-distance environment, employees may feel confused when they are left alone to figure out what they need to do and how to achieve their goals in terms of innovativeness (Jung/Chow/Wu 2003). In contrast to Poland, Germany is highly decentralized. In Germany, a direct and participative communication and meeting style is common, control is disdained, co-determination rights are comparatively extensive and must be considered by management (Hofstede 2016: Poland with comparison country Germany). These features are conducive to employee empowerment.

Taking into account the above discussion and the fact that Germany is a less hierarchical society than Poland, we offer the following hypothesis:

H2 b. Employee empowerment is positively related to innovativeness in German firms.

Innovativeness and Firm Performance

According to management scholars, innovation is one of the most important determinants of firm performance (Sethibe/Steyn 2015). By introducing product innovations, a firm has the potential to earn atypical profits and enter new markets, while process innovations can enable a firm to reduce costs (see Kleis et al. 2012). The relationship between innovation and firm performance has been broadly studied both in SMEs (Freel/Robson 2004; Mavondo/Chimhanzi/Steward 2005; Kmiecik et al. 2012; Yeoh 2014; Kunttu/Torkkeli 2015) and large enterprises (Hult/Hurley/Knight 2004; Lee/Tsai 2005). In general, innovation is positively related to firm performance, although some studies were not able to identify its direct effects (Mavondo et al. 2005). In the study of Polish SMEs, innovation activity was not directly related to financial performance, that is, profitability growth and income growth; however, it was related to subjective measures of firm performance (Kmiecik et al. 2012). Hence, results may depend on measures that were used in the empirical research. On the basis of previous research, we state the following hypothesis:

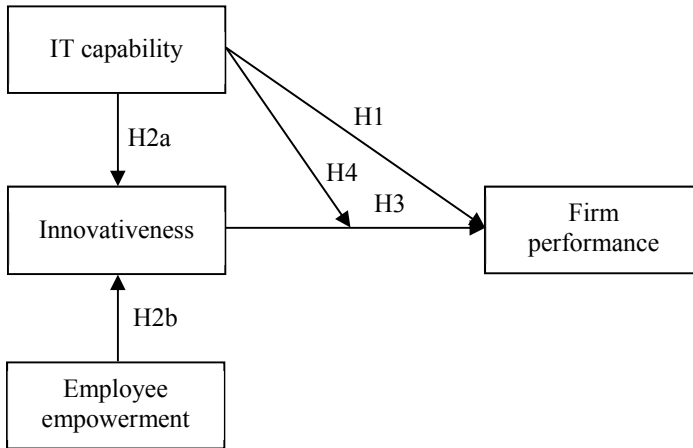
H3. Innovativeness is positively associated with firm performance in German firms.

The Moderating Effect of IT Capability

Some researchers claim that IT can be used to leverage other resources or capabilities and to strengthen their impact on firm performance (Schlemmer/Webb 2009). Therefore, other organizational constructs should be considered when studying the relationship between IT and firm performance. One such organizational construct is innovation. Huang and Liu (2005) found that although investments in IT were not significantly related to firm performance, if one considers the interaction between innovation and IT, a positive effect on financial performance is found. IT capability improves learning in a firm, enables them to quickly and cost-effectively access appropriate information from a wide scope of sources, and can facilitate the dissemination, shared interpretation, and internal storage of information, thereby improving the ability to respond to potential changes and to innovate (Tippins/Sohi 2003; Cai/Huang/Liang 2014). Therefore, we assume here that IT capability facilitates the relationship between innovativeness and firm performance.

H4. IT capability moderates the influence of innovativeness on the firm performance of German firms.

Figure 1 shows the relationships between the constructs we investigated in this research.

Figure 1: Research Model

Methodology

Sample and Procedure

We conducted our research of German firms in 2015 using an online questionnaire, the items in which were the same as those used in the research of Polish firms (Kmieciak et al. 2012). Respondents from 100 German firms completed the questionnaire. These respondents were chosen based on their IT responsibility in the companies and were organized by an access panel provider to ensure participation and response quality. The panel provider sent the online questionnaire to respondents who fulfilled the research criteria, so appropriate IT managers of German firms have participated in the survey. The sample descriptions are presented in Table 1.

The research of Polish firms was conducted in 2010. Managers from 109 SMEs returned their questionnaires, which represented a final response rate of 38 percent. A detailed methodology of this research was provided in a previous paper (Kmieciak et al. 2012).

Table 1: Sample characteristics

Polish firms			German firms		
	Survey sample			Survey sample	
Characteristics	<i>n</i>	%	Characteristics	<i>n</i>	%
<i>Number of employees in a firm</i>			<i>Number of employees in a firm</i>		
10–49	62	56,9%	51–100	27	27,0%
50–249	47	43,1%	101–500	44	44,0%
Total	109	100,0%	501–1000	27	27,0%
			No response	2	2,0%
			Total	100	100,0%
<i>Firm sector</i>			<i>Firm sector</i>		
Manufacturing	29	26,6%	Education	11	11,0%
Construction	29	26,6%	Manufacturing	11	11,0%
Sales	15	13,8%	Retail Trade	10	10,0%
Other sectors	36	33,0%	Public Service	9	9,0%
Total	109	100,0%	Health Service	7	7,0%
			IT	6	6,0%
			Transportation	5	5,0%
			Construction	3	3,0%
			Tourism	3	3,0%
			Other sectors	35	35,0%
			Total	100	100,0%

Measures

We measured each item on a seven-point Likert scale (1 = strongly disagree, and 7 = strongly agree). All measures were translated into Polish or German, respectively. The list of items used in the German study included 82 questions (Appendix A). A set of items related to innovativeness, empowerment, IT capability, and firm performance was generated based on the literature review. Based on our experience that firms are reluctant to provide objective financial data, subjective measures of firm performance were used in our study. However, it is worth noting that subjective measures of company performance are widely used in research and some scholars have claimed that subjective and objective measures of company performance are positively associated (Wall/Michie/Patterson/Wood/Sheehan/Clegg/West 2004).

In order to identify empirical dimensions of innovativeness, empowerment and IT capability, a factor analysis was carried out, as detailed in the previous paper (Kmiecik et al. 2012). Exploratory factor analysis allowed for the identification

of 13 dimensions. The items were divided into dimensions of innovativeness (I1–I7), employee empowerment (E1–E3), and IT capability (ITC1–ITC3). Table 2 lists the dimensions identified in the previous research (Kmieciak et al. 2012), which were also used in our German research. The alpha reliabilities of the scales ranged from 0.68 to 0.96 in the Polish study and from 0.57 to 0.96 in the German study.

Table 2: Dimensions of innovativeness, employee empowerment and IT capability

		Dimension	Number of items	Cronbach's. Alpha – Polish study	Cronbach's. Alpha – German study
Innovativeness (I)	I1	Market turbulence	2	0.68	0.654
	I2	Technological turbulence	3	0.862	0.868
	I3	Competitive intensity	4	0.732	0.746
	I4	Knowledge dissemination	4	0.805	0.853
	I5	Climate for innovation	11	0.928	0.573
	I6	Investments in innovation	2	0.894	0.915
	I7	Innovation activity	11	0.933	0.938
Employee Empowerment (E)	E1	Formalization	4	0.78	0.780
	E2	Centralization	3	0.867	0.910
	E3	Climate for empowerment	14	0.958	0.964
IT Capability (ITC)	ITC1	IT knowledge	4	0.94	0.918
	ITC2	Integration of IT with business strategy	8	0.95	0.934
	ITC3	IT in internal communications	5	0.935	0.885
Firm's. Performance	SFP	Subjective measure of firm performance	7	n/a	0.885

Results

The results section was divided into two sub-sections reflecting two adopted approaches to data analysis: (1) partial least squares, and (2) correlation and multiple regression analyses.

Partial Least Squares

In this section, we describe our application of the partial least squares (PLS) algorithm in order to examine the relationships between firm performance and the dimensions of innovativeness, employee empowerment, and IT capability. To determine which dimension has the more crucial influence on a firm's innovation ability, we performed the analysis in several steps.

The PLS structural equation model consists of formative elements, of which I1...I7, E1...E3, and ITC1...ITC3 are second-level formative measures (Table 3). The summarized model results are shown in Figure 2. The results of the moderating effects posited in H4 are presented in Table 4. The difference between the path coefficients is 0.417. Highly pronounced moderators significantly reduce the effect of innovativeness on a firm performance. We calculated a t-value (Sarstedt/Henseler/Ringle 2011) of 2.0294, which represents a significance level of less than 0.05.

Table 3: Formative elements

Dimension		weights	t-values
I	I1 -> I	0,060	7,7958**
I	I2 -> I	0,098	7,8142**
I	I3 -> I	0,110	8,0022**
I	I4 -> I	0,142	11,0211**
I	I5 -> I	0,366	13,7533**
I	I6 -> I	0,088	8,8978**
I	I7 -> I	0,390	13,8829**
E	E1 -> E	0,155	5,5114**
E	E2 -> E	0,010	0,3775
E	E3 -> E	0,911	31,9484**
ITC	ITC1 -> ITC	0,256	20,4660**
ITC	ITC2 -> ITC	0,505	32,6836**
ITC	ITC3 -> ITC	0,303	25,2612**

Notes: * $p < 0.1$; ** $p < 0.01$

The summarized model results shown in Figure 2 reveal that a firm's performance is influenced to the greatest extent by innovativeness. Apparently, the climate for innovation (I5) and innovation activity (I7) have a higher relevance with respect to innovativeness (I) than the other indicators. IT capability has a lower influence on a firm's performance than innovativeness. Here, IT in internal communication (ITC3) and integration of IT with business strategy (ITC2) have a higher importance than IT knowledge (ITC1). IT capability also influences innovativeness, which supports H2 a. Innovativeness is also related to employee empowerment. While the climate for empowerment (E1) has a higher relevance with respect to employee empowerment (EE) than the other indicators, the innovativeness of a company, and to a lesser extent its IT capability, do affect a firm's performance. The results support H1 and H3. Interestingly, the stronger the role IT capability plays as moderating variable vis-à-vis innovativeness and firm performance, the lower the strength of their relationship (H4).

Figure 2: Summarized model results

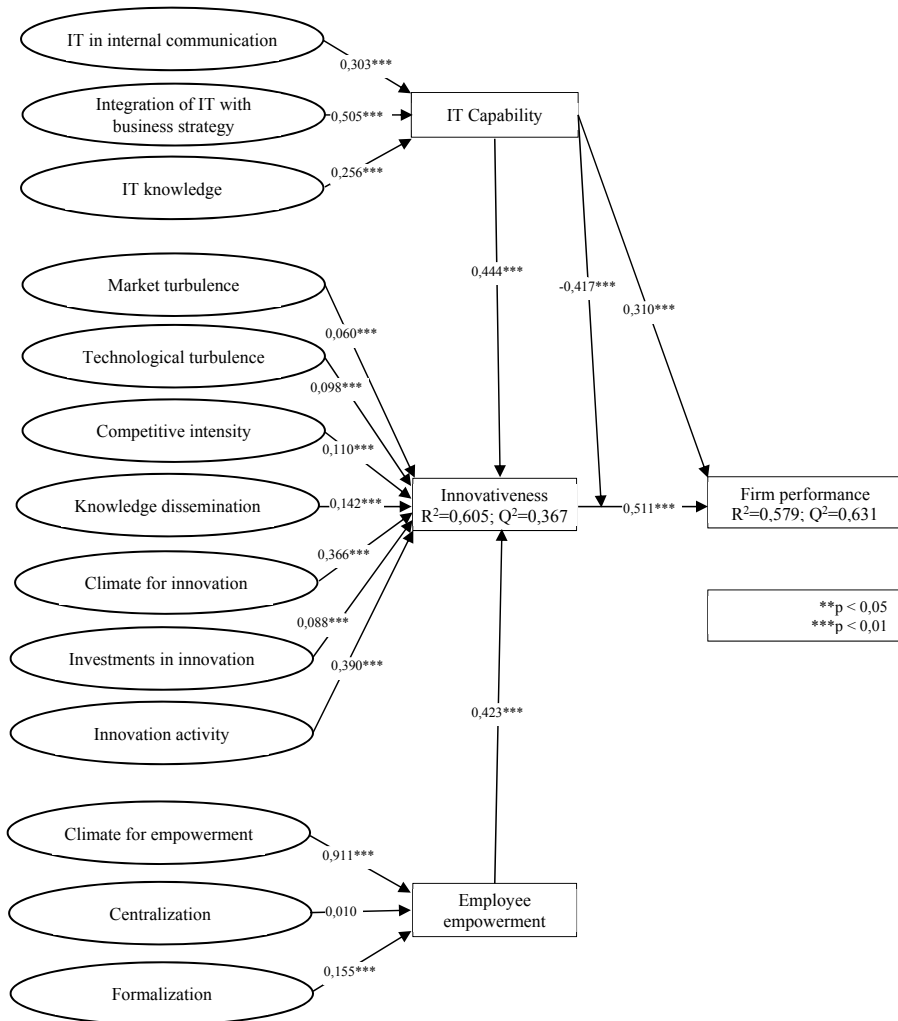


Table 4: Moderating elements

High pronounced moderators (55 samples)			
	Path coefficient	Std. Error	t-value
I -> SPF	0,2794	0,1512	1,8484*
Low pronounced moderators (43 samples)			
	Path coefficient	Std. Error	t-value
I -> SPF	0,6964	0,1329	5,2399**

Notes: *p < 0.1; **p < 0.05

Table 5: Descriptive statistics and correlation matrix

	I1	I2	I3	I4	I5	I6	I7	E1	E2	E3	ITC1	ITC2	ITC3	SFP
I1	1.00													
I2	0.57*	1.00												
I3	0.61*	0.59*	1.00											
I4	0.37*	0.28*	0.32*	1.00										
I5	0.43*	0.40*	0.47*	0.80*	1.00									
I6	0.49*	0.47*	0.44*	0.44*	0.53*	1.00								
I7	0.40*	0.43*	0.43*	0.53*	0.71*	0.61*	1.00							
E1	0.21*	0.19	0.30*	0.49*	0.40*	0.30*	0.47*	1.00						
E2	0.15	0.21*	0.23*	0.10	0.10	0.15	0.17	0.38*	1.00					
E3	0.26*	0.06	0.13	0.70*	0.71*	0.30*	0.59*	0.49*	-0.04	1.00				
ITC1	0.27*	0.39*	0.36*	0.42*	0.52*	0.39*	0.59*	0.40*	-0.03	0.50*	1.00			
ITC2	0.36*	0.40*	0.39*	0.41*	0.59*	0.54*	0.68*	0.43*	0.10	0.53*	0.79*	1.00		
ITC3	0.28*	0.39*	0.29*	0.49*	0.53*	0.47*	0.66*	0.53*	0.05	0.57*	0.76*	0.82*	1.00	
SFP	0.32*	0.22*	0.32*	0.56*	0.68*	0.50*	0.68*	0.45*	0.01	0.69*	0.53*	0.59*	0.63*	1.00
Mean	4.64	5.06	4.53	4.69	4.36	3.82	4.14	4.77	4.09	4.60	4.53	4.23	4.53	4.44
SD	1.39	1.31	1.28	1.16	1.19	1.48	1.26	1.26	1.65	1.24	1.26	1.32	1.28	1.02

Note: *Correlation significant at: p < 0.05

We also note that a positive correlation between IT capability, innovativeness, and firm performance is clearly shown in this measurement. The highest influence on the dimension of firm performance can be attributed to innovativeness, in which the highest indicators are innovation activity and innovation climate. In comparison, it appears that the dimension of IT capability (highest IT indicators in internal communication) has a lesser effect on firm performance.

Correlation and Multiple Regression Analyses

Next, we applied correlation and multiple regression analyses to further examine the relationships between firm performance and the innovativeness and IT capability dimensions. The calculated means, standard deviations (SDs), and Pearson's linear correlation coefficients of the variables of these analyses are presented in Table 5. In order to test the H1–H3, we carried out multiple regression analysis using a backward selection method. In this analysis, the subjective measures of firm performance and innovation activity are the dependent variables, and the dimensions of innovativeness, employee empowerment, and IT capability are the independent variables (Table 6).

Table 6: Multiple regression analysis results

	Subjective measures of firm performance				Innovation activity			
	Initial model		Final model		Initial model		Final model	
	β	B	β	B	β	B	β	B
I1	0.02	0.02			0.13	-0.03		
I2	-0.15	-0.11			0.24	0.07		
I3	0.08	0.06			0.22	0.05		
I4	-0.15	-0.13			-0.03*	-0.28*		
I5	0.32*	0.27*	0.21*	0.18*	0.71*	0.43*	0.40*	0.42*
I6	0.15	0.10			0.35*	0.21*	0.25*	0.21*
I7	0.17	0.14	0.23*	0.18*				
E1	0.06	0.05			0.24	0.07		
E2	-0.06	-0.04			0.15	0.05		
E3	0.28*	0.23*	0.28*	0.23*	0.46*	0.23*		
ITC1	-0.01	-0.01			0.25	0.04		
ITC2	-0.12	-0.09			0.27	0.01		
ITC3	0.30*	0.24*	0.21*	0.17*	0.45	0.21	0.33*	0.32*
Constant		1.34*		1.06*		-0.41		0.05
F		12.65		39.86		16.24		59.38
R ²		0.66		0.63		0.69		0.65
Adjusted R ²		0.60		0.61		0.65		0.64

Notes: * $p < 0.05$

We obtained 10 regression models with respect to the subjective measures of firm performance. The tenth model includes four variables: climate for innovation (I5), innovation activity (I7), climate for empowerment (E3), and use of IT in internal communications (ITC3). This final model has an explanatory power of 63 percent. The results support H3 and partly support H1.

We also obtained 10 regression models with respect to innovation activity, and the tenth model includes three variables: climate for innovation (I5), investments in innovation (I6), and use of IT in internal communications (ITC3). This final model has an explanatory power of 65 percent. The results are partly supporting H2 a, but are not supporting H2 b.

To examine the moderating relationships posited in H4, we split the sample at the mean value of the IT capability (mean = 4.43, SD = 1.20) into two groups, representing low (n = 43, mean = 3.35, SD = 0.86) and high (n = 57, mean = 5.24, SD = 0.63) levels. We then conducted correlation and multiple regression analyses. The correlation coefficients of firm performance and all the dimensions of innovativeness and employee empowerment (except dimension E2 – centralization) do not differ significantly ($p < 0.05$) in these two groups. Moreover, the multiple regression analysis results indicate that innovation activity does not have a significant effect on the subjective measure of firm performance in either the high or low IT capability groups, which suggests a lack of support for H4 (Table 7).

Table 7: Moderating effect of IT capability

Path	Moderator		β
Innovation activity → subjective measure of firm performance	IT capability	IT capability – low	0,27 (t-value =1,37)
		IT capability – high	-0,06 (t-value=-0,39)

The results presented in this paper show that, in German firms, one dimension of IT capability, that is, the use of IT in internal communications, is positively associated with the subjective measures of firm performance, which partly supports H1. In Polish SMEs, by contrast, IT knowledge relates to firm performance. Perhaps in German firms, which are presumably in better financial condition than Polish SMEs, IT knowledge is a given and common attribute, and thus is not perceived as a competitive advantage and therefore is not related to firm performance. In German firms, there is a significant relationship between the use of IT in internal communications and innovation activity; this finding is consistent with the Polish research (Table 8). Hence, it appears that, regardless of country, IT facilitates the exchange of opinions, knowledge sharing, and work coordination, thus contributing to innovation (Carbonara 2005).

Table 8: Variables significantly positively related (+) to innovation activity and subjective measure of firm performance in German and Polish studies

	Dimension	Innovation activity		Subjective measure of firm performance	
		German firms	Polish firms	German firms	Polish firms
I1	Market turbulence				
I2	Technological turbulence		+		
I3	Competitive intensity				
I4	Knowledge dissemination				
I5	Climate for innovation	+	+	+	
I6	Investments in innovation	+	+		+
I7	Innovation activity			+	+
E1	Formalization				
E2	Centralization				
E3	Climate for empowerment			+	
ITC1	IT knowledge				+
ITC2	Integration of IT with business strategy				
ITC3	IT in internal communications	+	+	+	

Contrary to H4, results do not confirm that IT capability has a moderating effect on the relationship between innovativeness and the firm performance of German firms. Nor did the research results of the Polish SMEs confirm this moderating effect. As such, the moderating effect of IT capability requires further investigation using a larger sample size.

In general, the innovativeness of German firms is positively related to firm performance. This finding is consistent with the previous study conducted on Polish SMEs (Kmieciak et al. 2012). In both studies, we found that innovation activity is positively related to the subjective measure of firm performance. Hence, regardless of the country and its degree of economic development, innovation appears to be an important determinant of firm performance, which confirms previous opinions (Sethibe/Steyn 2015).

Conclusions and Discussion

This study examined the relationships between IT capability, innovativeness, employee empowerment, and firm performance in German firms.

As far as IT capability is considered, one of the three dimensions of IT capability, using IT in internal communications, was found to be related with innovation activity. This finding confirms the important role of IT in innovation processes. As Carbonara (2005) mentioned, IT facilitates work coordination, knowledge

sharing and helps the processes of collective learning, underpinning the innovation processes. When a firm uses IT in internal communications and has proper databases for storing and sharing information, this will facilitate and encourage the employees to engage in innovative activities (Lee/Leong/Hew/Ooi 2013).

Moreover, our study reveals that using IT in internal communications is positively associated with firm performance. This finding is consistent with some prior research. Specifically, based on 144 responses from US firms, Wu, Mahajan, and Balasubramanian (2003) found that IT adaption in communications significantly influenced performance measures, including efficiency, sale performance, customer satisfaction, and relationship development. On the other hand, according to our multiple regression analysis, two other dimensions of IT capability, IT knowledge and integration of IT with business strategy, are not related to firm performance. Moreover, previous studies on relationships between IT capability and firm performance also provided inconsistent results (see Sabherwal/Jeyaraj 2015). The relationship between IT capability and firm performance seems to be very complicated and probably dependent on a specific firm context. Moreover, as Chae et al. (2014) suggested, the importance of IT for firms might have eroded in recent years because of universalization or commoditization. Therefore, the link between IT capability and firm performance needs further investigation.

In general, the results show that innovativeness of German firms is positively related with subjective measures of firm performance, including such measures as quality of our products/services, consumer satisfaction, market share, and number of customers. This result is consistent with previous studies (Hult et al. 2004; Lee/Tsai 2005; Rubera/Kirca 2012). Among all dimensions of innovativeness, the climate for innovation and innovation activity contribute the most to firm performance. It is partly consistent with the results of Baer and Frese (2003) who, based on study of 47 mid-sized German companies, found direct relations between climates for initiative and psychological safety and firm performance. They stated that “companies that encourage their employees to engage in self-starting behaviors and provide a personally non-threatening work environment are more successful in terms of firm goal achievement and return on assets” (Baer/Frese 2003:57). Moreover, in the present study, climate for innovation is also related to innovation activity. The important role of climate of innovation in an organization was also indicated by, for example, Somech and Drach-Zahavy (2013), who concluded that that employees’ creativity translates to innovation implementation only under high levels of climate for innovation.

Surprisingly, contrary to previous studies (Çakar/Ertürk 2010; Knight-Turvey 2006; Spreitzer/Janasz/Quinn 1999), none of the dimensions of employee empowerment are related to innovation activity, according to multiple regression analysis results. Rather than simply accepting this result, however, we believe

that their impact of employee empowerment on innovativeness may be more subtle and indirect through a climate of innovation. It is supported by the results of our correlation analysis, which indicate the strong and positive correlation between climate of empowerment and climate for innovation.

This paper compared the relationships between IT capability, innovativeness, employee empowerment, and firm performance in two neighbouring countries that are at differing stages of economic development. Although the factors influencing innovation activity are similar in German and Polish firms, there are significant differences in those influencing firm performance.

The results show that, with respect to innovation activity, the climate for innovation, as well as the climate for empowerment, and the use of IT in internal communications are related to firm performance, whereas in the earlier Polish research, other dimensions were related to the subjective measure of firm performance, including investment in innovation and IT knowledge (see Table 9). These results suggest that in a developed country like Germany it is particularly important to create an appropriate climate among employees, which includes encouraging them to try new ways of doing things, thinking and behaving in original ways, and seeking novel solutions. Appropriate climate is related to both innovation activity and firm performance in German firms. In Polish firms, the climate for innovation was also related to innovation activity, but was not directly related to firm performance. In Polish SMEs, investments in new machinery, equipment, and methods of production correlated more with firm performance than did building a culture of innovation.

To some extent, the disparate results of the Polish and German studies may be explained by their differences in economic development and culture as well as sample characteristics. Poland is a less developed country than Germany, and perhaps in the conditions of a post-socialist economy there are other factors that more significantly influence firm performance. On the other hand, the German economy is more innovative than the Polish economy (European Commission 2016) and investments in innovation may be more standard and routine. Therefore, they do not generate a competitive advantage and are not related significantly to firm performance. Similarly, IT knowledge may be a standard resource in German firms, whereas in Polish SMEs, IT knowledge may be perceived as a scarce resource that plays important role in the context of SME performance.

When it comes to differences in culture, Poland has a very high preference for avoiding uncertainty and is a more hierarchical country than Germany (Hofstede 2016: Poland with comparison country Germany). Countries exhibiting high uncertainty avoidance maintain rigid codes of belief and behaviour and are intolerant of unorthodox behaviours and ideas. In these cultures, there is an emotional need for rules (even if the rules never seem to work), time is money, people have an inherent urge to be busy and to work hard, precision and punctuality are the

norm. It may have a negative impact on climate for innovation in firms and, as a consequence, innovation may be resisted. Therefore, a lower preference for avoiding uncertainty in Germany than in Poland may have a positive impact on creating the appropriate climate for innovation in German firms. As a consequence, shaped by national culture climate for innovation plays a significant role in German firms and, contrary to Polish firms, is positively correlated with firm performance.

In contrast to Poland, Germany is highly decentralized, is supported by a strong middle class, and ranks low in terms of its power distance (Hofstede 2016: Poland with comparison country Germany). Co-determination rights in Germany are comparatively extensive and must be considered by management. A direct and participative communication and meeting style is common, control is disdained, and leadership is often challenged to show expertise, and is best accepted when it is demonstrated. The differences in national culture may be reflected in the employee empowerment approach; that is, greater employee empowerment is expected in a less hierarchical country. The above arguments may explain existence the significant and positive relationships between climate for empowerment and firm performance in German firms, contrary to Polish firms, where such a clear relationship was not found.

The disparate results of the Polish and German studies may be also explained by the size of the firms that participated in the studies. The Polish sample included small and medium enterprises, whereas the German sample included medium and large enterprises. Small enterprises differ from large enterprises in many ways (Hudson/Smart/Bourne 2001; Brzostek/Michna 2016; Michna/Kmiecik/Burzyńska-Ptaszek 2017). For example, small enterprises have limited resources in terms of management, manpower, and finance. On the other hand, they are more flexible and less formalized than large enterprises. Due to the number of employees, using IT in internal communication might be more crucial in larger enterprises than in smaller ones. That may be the reason why using IT in internal communication is related to firm performance in the German sample, contrary to the Polish sample. Moreover, larger enterprises usually have internal technical development and maintenance capabilities (that is, an IT department) and larger enterprises are expected to have greater IT knowledge than small enterprises. IT knowledge in large enterprises is more common, and is therefore not a competitive advantage and does not improve firm performance (observed in the German sample); this is contrary to smaller firms, where IT knowledge might be scarce and distinctive and, as a consequence, impact on firm performance (observed in the Polish sample).

Theoretical Implications

This paper contributes to the management literature by identifying the relationships between IT capability, innovativeness, employee empowerment, and performance in German firms. Moreover, the obtained results are compared with results of the similar study conducted in a neighbouring, but less developed country – Poland. To our knowledge, such comparison has not been carried out previously. The comparison has implication for innovation management suggesting that, regardless of the firm size or the country, appropriate climate for innovation, investments in innovation, and using IT in internal communication are significant determinants of innovation activity, which in turn is related to firm performance.

Results of our study confirm that IT capability, innovativeness, and employee empowerment are multidimensional constructs. Therefore, investigating the relationships only between these constructs and drawing conclusions on this basis might be too general. In other words, investigating relationships between various dimensions of these three constructs seems to be reasonable. In this way, it appears that only some dimensions of the examined constructs are significantly related to innovation activity or firm performance.

Practical Implications

The results of this research are useful for managers who are interested in improving innovativeness and firm performance. First of all, managers in German and Polish firms should pay particular attention to the climate for innovation. Innovation activity is more likely to occur when managers create an appropriate climate; that is, they support new ideas and their implementation, encourage people to think and behave in original and novel ways, and reward creativity and innovation. When a firm has an appropriate climate for innovation, employees feel safe speaking up and taking risks without the fear of being rejected or punished (Baer/Frese 2003). We argue that systematic efforts to enhance climate for innovation is important for firms that want to improve their innovativeness and introduce more innovation. Innovation activity is also enhanced by investments in innovation and using IT in internal communication. Investments in new machinery and equipment, new methods of production, using IT to facilitate discussions and feedback, to update employees about developments within a company, to coordinate new product development teams, and to manage projects within the company, are all activities that are expected to improve a firm's innovativeness both in German and Polish firms.

Differences between German and Polish firms can be observed in areas of empowerment and IT knowledge. A climate for empowerment seems to be more crucial in the case of German firms. Hence, managers in German firms should perform such activities as developing a trusting relationship with employees by

sharing information, encouraging employees to believe in themselves and openly express their feelings and concerns, and helping employees to set meaningful goals. In Polish SMEs, on the other hand, managers should focus on developing IT knowledge among employees and providing IT technical support. The above differences might be important for managers operating in the international German-Polish context.

Limitations and Future Research

Differences in the sample characteristics of the Polish and German firms is one of the limitations of our study. In this paper, we compared results of research conducted in firms that employ 10–249 employees (Polish SMEs) to those conducted in firms that employ 51–1,000 employees (German firms). Because SMEs differ from large firms in several ways (Hudson et al. 2001), the differences in the obtained results of the empirical studies may be due to both the country of origin and the size of the firms. Moreover, our research of German firms was conducted five years after that of the Polish firms. During these five years, innovativeness, employee empowerment and the degree of IT capability of Polish SMEs, or the relationships between these constructs and firm performance, may have changed. We realize that IT technology and IT applications are changing and developing very quickly. Therefore, we focused our research effort on IT knowledge and utilization that supports various business functions, rather than on IT infrastructure or investments. This method is consistent with Bharadwaj et al. (1999), who stated “it is more important for firms to move away from focusing too narrowly on singular applications whose competitive advantage is at best short-lived, but instead focus on creating a firm-wide IT capability that provides a substantive basis for sustained IT innovation” (p. 384). We believe that the measures we used in this study are time-resistant; that is, they allowed us to assess innovativeness, employee empowerment, IT capability, and firm performance both in 2010 and in 2015. However, because data was collected at different times, the validity of the comparative results might be in question. Therefore, longitudinal studies might be useful extensions.

We compared results of empirical research obtained in Germany and Poland – two neighbouring countries that are at different economic development stages. However, to better assess the generalizability of our results, our research should be extended to firms in other countries.

Although empirical research was conducted among enterprises from different sectors, results presented in this paper relate to the total number of surveyed firms. The relationships between IT capability, innovativeness, employee empowerment and firm performance were not presented for subgroups of firms divided by sector or size because the number was too small to be reliable. Hence, we cannot exclude that the studied relationships are different in those subgroups.

Moreover, another limitation of this study is the heterogeneity of the German and Polish samples in terms of firm sector. There are different proportions of firms from different sectors in both samples. Moreover, firms in different sectors (e.g. manufacturing vs. IT) may have different sources and approaches to innovativeness and IT capabilities, hence the issue is whether they can be directly compared in their performance. As a consequence, the explanatory and comparative value of this study may be questionable. Thus, as a suggestion for future research, it's recommendable to conduct an inter-industrial study in Germany and Poland to have a better compatibility of samples and validity of results.

Moreover, this study was limited by the subjectivity of the data. From each responding firm, there was only one key informant who expressed his/her opinions about IT capability, employee empowerment, innovativeness and firm performance. Those opinions might not be shared by other managers or employees. Moreover, it might be disputable whether one IT manager is capable of evaluating a broad range of firm performance indicators. However, we believe that managers from various departments, including IT, have at least a general knowledge of firm performance. Although we attempted to select a well-informed respondent from each firm, in future research, the sample of respondents could be widened. Moreover, using objective measures and archival data for some variables may provide more objective results.

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Appendix A: Constructs and indicators

Dimensions of innovativeness

Market turbulence

Adapted from Jaworski and Kohli (1993):

- (1) In our kind of business, customers' product preferences change quite a bit over time.
- (2) Our customers tend to look for new products all the time.

Technological turbulence

Adapted from Jaworski and Kohli (1993):

- (1) Technological changes provide big opportunities in our industry.
- (2) A large number of new product ideas have been made possible through technological breakthroughs in our industry.
- (3) The technology in our industry is changing rapidly.

Competitive intensity

Adapted from Jaworski and Kohli (1993):

- (1) One hears of a new competitive move almost every day.
- (2) Price competition is a hallmark of our industry.
- (3) There are many "promotion wars" in our industry.
- (4) Anything that one competitor can offer, others can match readily.

Knowledge dissemination

Adapted from Zack et al. (2009):

- (1) Our employees are valued for what they know.
- (2) Our firm encourages and rewards the sharing of knowledge.
- (3) We are able to identify sources of expertise within our firm.
- (4) We have effective internal procedures for transferring best practices throughout the firm.

Climate for innovation

Adapted from Scott and Bruce (1994) and Wang and Ahmed (2004):

- (1) We are willing to try new ways of doing things and seek unusual, novel solutions.
- (2) We encourage people to think and behave in original and novel ways.
- (3) Our company can be described as flexible and continually adapting to change.
- (4) In our company, we tolerate individuals who do things in a different way.
- (5) Employees get a lot of support from managers if they want to try new ways of doing things.
- (6) The reward system encourages innovation in our company.
- (7) Creativity is encouraged in our company.
- (8) Our company gives employees free time to pursue creative ideas during the workday.
- (9) In our firm we seek new products and markets constantly.
- (10) When we see new ways of doing things, we are last at adopting them (reverse coded).
- (11) In our firm we are willing to take risks to seize and explore “chancy” growth opportunities.

Investments in innovation

Adapted from Wang and Ahmed (2004):

- (1) Our investments in new machinery and equipment are significant compared with our annual turnover.
- (2) Our investments in new methods of production are significant compared with our annual turnover.

Innovation activity

Adapted from Wang and Ahmed (2004):

- (1) In new product and service introductions, our company is often first-to-market.
- (2) In comparison with our competitors, our company has introduced more innovative products and services during the past three years.
- (3) Our new products and services are often perceived as very novel by customers.
- (4) In comparison with our competitors, our company has introduced more innovative production or delivery methods during the past three years.
- (5) New products and services in our company often take us up against new competitors.
- (6) Our firm will introduce new products within a year.

- (7) In new product and service introductions, our company is often at the cutting edge of technology.
- (8) In comparison with our competitors, our marketing activity is original and novel.
- (9) The number of new products is higher than last year.
- (10) During the past three years, our company has developed many new management approaches.
- (11) We are constantly improving our business processes.

Dimensions of employee empowerment

Formalization

Adapted from Jansen et al. (2006):

- (1) Whatever situation arises, written procedures are available for dealing with it.
- (2) Rules and procedures occupy a central place in our firm.
- (3) Written records are kept of everyone's performance.
- (4) Written job descriptions are formulated for positions at all levels in our firm.

Centralization

Adapted from Hage and Aiken (1967):

- (1) In our firm employees need to ask their supervisor before they do almost anything.
- (2) Most decisions people make here have to have their supervisor's approval.
- (3) Even small matters have to be referred to someone higher up for a final decision.

Climate for empowerment

Adapted from Niehoff et al. (2001):

In our company [...]:

- (1) managers are willing to give their time when employee needs it;
- (2) we convey ownership by talking in terms of our customer, our budget, our business;
- (3) we encourage a long-run, patient, disciplined approach versus a "flash in the pan" approach;
- (4) we develop a trusting relationship by sharing information;
- (5) we recognize that betterment of the team is as valuable as the results achieved;
- (6) we encourage employees to believe in themselves;
- (7) we encourage employees to openly express their feelings and concerns;

- (8) we establish trust and credibility when relating to employees;
- (9) we help employees to set meaningful goals;
- (10) we encourage employees to focus on what can be done rather than what has always been done;
- (11) we help remove roadblocks;
- (12) we inspire employees to do more than they thought they could;
- (13) we encourage employees to improve through analysis of every process and action within their control; and
- (14) we want employees to get involved when they see a need and not wait to be told or given permission.

Dimensions of IT capability

IT knowledge

Adapted from Tippins and Sohi (2003):

In our company [...]:

- (1) we have the knowledge to develop and maintain IT-based communication links with our customers;
- (2) we are very knowledgeable about new IT-based innovations;
- (3) IT technical support is sufficient; and
- (4) we possess a high degree of IT-based technical expertise.

Integration of IT with business strategy

Adapted from Bharadwaj et al. (1999) and Tippins and Sohi (2003):

In our company [...]:

- (1) implemented IT solutions fulfil our expectations;
- (2) we use IT to collect and analyze market information;
- (3) we frequently utilize decision-support systems;
- (4) there is a climate that encourages risk taking and experimentation with IT;
- (5) there is clarity of vision regarding how IT contributes to business value;
- (6) we have IT-based links with suppliers;
- (7) we have IT-based links with customers; and
- (8) there is integration of business strategic planning and IT planning.

IT in internal communications

Adapted from Wu et al. (2003):

In our company [...]:

- (1) we use IT to facilitate discussions and feedback on various issues of importance to our company;
- (2) we use IT to regularly update employees about developments within our company;
- (3) we use IT to facilitate internal communication between employees in different departments and different locations;
- (4) we use IT to coordinate new product development teams; and
- (5) we use IT to manage projects within company.

Firm performance

Subjective measures of firm performance:

- (1) The quality of our products/services is higher than it was last year.
- (2) Consumer satisfaction is greater than it was last year.
- (3) Our market share is higher than it was last year.
- (4) The number of customers is higher than it was last year.
- (5) Productivity per employee is higher than it was last year.
- (6) Business transaction costs are lower than they were last year.
- (7) Innovations introduced in the last three years have contributed to income growth in our firm.