

The relationship between innovation capability and performance : The moderating effect of measurement

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THE RELATIONSHIP BETWEEN INNOVATION CAPABILITY AND PERFORMANCE: THE MODERATING EFFECT OF MEASUREMENT

Structured Abstract:

Purpose

This paper discusses whether performance measurement moderates the relationship between innovation capability and firm performance.

Design/methodology/approach

The study was conducted through a web-based survey in small- and medium-sized enterprises (SMEs). A total of 311 responses were received from a sample of 2400 randomly selected SMEs.

Findings

Consistent with predictions, the link between innovation capability and firm performance is significant in the presence of performance measurement. Performance measurement can thus be used as a tool for improving the performance of SMEs through innovation capability.

Practical implications

Using the results of this study, practitioners can improve their innovation capability through performance measurement by taking better account of various aspects.

Originality/value

Previous research has studied the effects of performance measurement, but not in the area of innovation management. Previous research has also showed that measurement has positive effects on innovation capability. The present study goes one step further by investigating the impacts of measurement on the relationship of multiple aspects of innovation capability and firm performance.

Keywords: innovation capability; performance; performance measurement; performance management; SME; innovation

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1 Introduction

A firm's capability to produce innovations has been suggested to be crucial for its success. An innovation can be a new product or service, a new production process, or a new structure or administrative system (Hult et al., 2004). Since innovation capability is typically viewed as a multi-faceted construct, there is no common way to study it, due to the variety of perspectives of innovation management (Perdomo-Ortiz et al., 2006). Thus, the term 'innovation capability' has been defined in several ways. According to Neely et al. (2001), an organization's innovation capability can be described as its potential to generate innovative outputs. Lawson and Samson (2001) define innovation capability in closer detail as "the ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders". In addition, innovation capability varies from firm to firm and is determined by multiple factors (Silva et al., 2012).

The majority of previous studies in the area of innovation capability define it according to a categorization of different types of innovations. However, Rosenbusch et al. (2011) argue that small- and medium-sized enterprises (SMEs) benefit significantly more from a strategic innovation orientation than from just focusing on developing innovative products. This finding suggests that focusing solely on delivering innovative offerings to the marketplace might not fully leverage the potential of innovation. SMEs can benefit even more if they develop, communicate, and embrace an innovation orientation (Rosenbusch et al., 2011). Innovation-oriented SMEs have somewhat better opportunities to succeed also financially (c.f., Saunila, forthcoming). There is a research that suggests that innovation capability and performance are connected to each other (c.f., Calantone et al., 2002; Bowen et al., 2010), but whether the relationship can be facilitated through performance measurement has remained unsolved.

The objective of this research is to study whether measurement moderates the relationship between organizational innovation capability and firm performance. The study contributes to the current understanding by presenting the effects of measurement on the relationship between different aspects of organizational innovation capability and firm performance in the context of SMEs. Previous research has studied the effects of performance measurement, but not in the area of innovation management. According to Skarzynski and Gibson (2008), measurement is especially important for innovations, where there is a need to bring clarity to a fundamentally creative process. A study by Saunila and Ukko (2011) showed that measurement has positive effects on innovation capability. The present study goes one step further by investigating the impacts of measurement on the relationship of multiple aspects of innovation capability and firm performance. The results contribute to the existing discussion on the innovation capability-performance relationship by presenting the effects of measurement on the relationship, thus diminishing the gap between theory and practice, and by building requisites for further research.

2 Literature review

2.1 Innovation capability

A company's innovation capability can be described at several different levels and from several different perspectives (Olsson et al., 2010). Akman and Yilmaz (2008) define innovative capability as an important factor that facilitates an innovative organizational culture, the characteristics of internal promoting activities, and the capabilities of understanding and responding appropriately to the external environment. A firm's innovation capability can also be described as its ability to develop innovations continuously as a response to a changing environment (Olsson et al., 2010). Tuominen and Hyvönen (2004) suggest that the organizational innovation capability should be split into two separate entities: managerial innovation and technological innovation. Martínez-Román et al. (2011) divide innovation capability into three factors: knowledge, organization, and human factors, which all have a managerial innovation point of view. Another approach is to discuss the technological factors of innovation management and the human factors of innovation management (Prajogo and Ahmed, 2006). Human factors include people and social practices as ingredients in organizational success. In addition, the term 'business innovation capability' has been used to describe the critical success factors of innovation processes (Perdomo-Ortiz et al., 2006). These critical factors can be interpreted as business innovation capability dimensions; thus, the capability can be measured with the factors.

It has been stressed that the way towards organizational innovation does not have a unique imprinting, but it is likely to be a mixture of wise managerial initiatives, direct and indirect worker participation, and cooperative industrial relations (Mazzanti et al., 2006). Similarly, in this study, innovation capability is defined as consisting of the determinants influencing an organization's capability to manage innovation. A body of literature has identified these determinants shared by innovative organizations (c.f. Lawson and Samson, 2001; Romijn and Albaladejo, 2002; Bessant, 2003; Tidd et al., 2005; Perdomo-Ortiz et al., 2006; Martensen et al., 2007; Skarzynski and Gibson, 2008; Smith et al., 2008; Tura et al., 2008; Paalanen et al., 2009; Laforet, 2011; Saunila and Ukko, 2011). In accordance with the earlier literature and the previous study of Saunila and Ukko (2011), innovation capability has been divided into seven determinants in this study: participatory leadership culture, ideation and organizing structures, work climate and wellbeing, know-how development, regeneration, external knowledge, and individual activity. In this study, participatory leadership culture refers to the actions and perquisites created by the managers that facilitate and motivate innovation. Ideation and organizing structures related to the structures and systems that successful innovation requires, meaning the generation, development and implementation of innovations, and the ways how the work tasks of the organization are organized. Work climate and wellbeing represent the wellbeing of the employees and further the work climate for innovation development. Know-how development refers to the development of employee skills and knowledge that are needed

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, 63(2), 234-249.

in developing innovation capability. External knowledge aspect highlights the importance of the proper behavior of exploiting external networks and knowledge to the overall organizational innovation capability. Regeneration means an organization's ability to learn from earlier experience and to use that experience to create innovations and develop their operations. Also employees' individual activity in developing innovations is needed to form the organization's overall innovation capability.

2.2 Innovativeness and performance

Innovativeness is an important determinant of an organization's performance (Calantone et al., 2002; Hult et al., 2004). Thus, organizational performance can be improved through technical and administrative innovation besides other factors (Lloréns Montes et al., 2005). Previous research has studied the effects of innovations and innovativeness on organizational performance (c.f., Calantone et al., 2002; Cainelli et al., 2004; Keskin, 2006; Bowen et al., 2010; Rhee et al., 2010; Gunday et al., 2011; Jiménez-Jiménez and Sanz-Valle, 2011). Innovating firms have been found to have higher levels of productivity and economic growth than non-innovating firms (Cainelli et al., 2004). Not only technical innovations but also organizational innovations are essential conditions for improving performance and for increasing the firm's value (Lloréns Montes et al., 2005; Bowen et al. 2010). Organizational innovations not only prepare a suitable milieu for the other innovation types, but also have a strong and direct impact on innovative performance (Gunday et al. 2011). In addition, a firm's overall performance and organizational innovations are strictly and positively related to each other (Mazzanti et al., 2006). Thus, managers should recognize and manage the innovations in order to boost their operational performance (Gunday et al., 2011).

2.3 The moderating effect of measurement

Previous research has presented the impacts of performance measurement (Ukko et al., 2008; Graftona et al., 2010; de Leeuwa and van den Berg, 2011; Kohlbacher and Gruenwald, 2011; Teeratansirikool et al., 2013). Performance measurement means quantifying the input, output, or level of activity of an event or process (Radnor and Barnes 2007). It has been suggested that effective use of performance measures guide managers' behaviors toward enhancing critical aspects of firm outcomes such as profit, cash flow, new product development, and personnel development (Teeratansirikool et al., 2013). Measurement can have impacts on, for example, the exploitation of external capabilities (Grafton et al., 2010); behavioral factors of a firm, namely, understanding, motivation, and focus on improvement (de Leeuwa and van den Berg, 2011); or the employees' motivation, learning opportunities, decision-making opportunities, and achievement of goals (Ukko et al., 2008). In addition, the impacts of performance measurement depend on the way it is used (Pavlov and Bourne, 2011). Performance measurement can affect an organization's routines in three ways: Pavlov and Bourne (2011) call them the trigger effect of measurement, the guidance effect of measurement, and the

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, 63(2), 234-249.

intensification effect of measurement. First, when measurement is used in its feedback-generating function, the measures communicate the results of the past execution of the routine and indicate whether its performance is adequate to the demands of the environment. Second, when measurement is used in its feed-forward function, it can affect the direction of the change in organizational processes. Third, measuring performance forces managers to search for a match between the existing idea and expression of the routine, stimulating the process of adjusting the two parts of the routine in order to respond to the new demands of the environment.

In addition, the moderating effects of performance measurement have been studied. According to Bourne et al. (2003), performance measurement has an impact on the environment in which it operates. Starting to measure as well as deciding what to measure, how to measure, and what the targets will be are all acts that influence individuals and groups within the organization. Once measurement has started, the performance review will have consequences, as will the actions agreed upon as a result of that review. Performance measurement is, therefore, an integral part of the management planning and control system of the organization being measured. The alignment between performance measures and strategy has also been found to affect performance. A study of van der Stede et al. (2006) found that the pairing of quality-based manufacturing strategies with the extensive use of subjective non-financial performance measures had a positive performance effect. The relationship between product innovation and performance has also been found to be more positive the more interactively management control systems are used. The more interactively the managers use formal management control systems, the greater the positive effects of product innovation on performance are (Bisbe and Otley, 2004). Moreover, performance management has been found to mediate the relationship between management innovations and organizational performance (Walker et al., 2011).

2.4 Research model and hypotheses

A great number of studies focusing on the innovation-performance relationship provide a positive appraisal of higher innovativeness resulting in increased corporate performance (Gunday et al., 2011). However, there is a lack of studies investigating the moderating effect of measurement in the relationship between innovation capability and performance. The positive impacts of measurement have also been studied previously, but the studies often focus only on the positive impacts of measurement. In addition, previous studies focusing on innovation measurement have discussed the ways of measurement in innovation capability and innovation outputs rather than considering measurement as a moderator in the relationship between innovation capability and outputs. Thus, the purpose of this study is to explore the impact of measurement on the relationship between innovation capability and firm performance within the context of SMEs. Measurement refers to the process of quantifying the level of action, which is in this research focused on innovation capability. The theoretical review discussed in previous sections led to the research framework presented in Figure 1.

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, 63(2), 234-249.

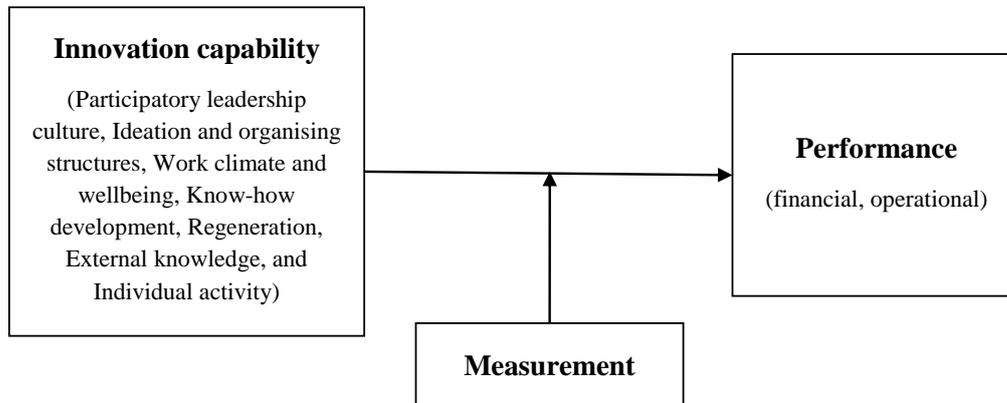


Figure 1. Research model and hypotheses.

A quantitative design is used to determine whether there exists a moderating effect of measurement on the relationship between the determinants of innovation capability: namely, participatory leadership culture, ideation and organizing structures, work climate and wellbeing, know-how development, regeneration, external knowledge, individual activity, and firm performance. The presumption is that the determinants of innovation capability have an effect on performance and this effect is stronger in the presence of measurement. Thus, based on the review of past literature on effects on measurement, the following seven hypotheses can be presented.

For example Bititci et al. (2006) have discovered that a successfully implemented and used performance measurement, through cultural change, leads to a more participative and consultative management style. Also Hall (2008) has studied the impacts of performance measurement systems on management and concluded that measurement influence managers' cognition and motivation. This also may result more active participation of managers. Measurement assists the leadership culture to become more participative. Thus, the following hypothesis can be formulated:

H1: Measurement moderates the relationship between participatory leadership culture and firm performance

Measurement can also be used for coordinating activities within and among departments and thus help improving cooperation and coordination among people within the organization (Franco-Santos et al., 2012). Cruz et al. (2011) find that reorganizing measurement fostered generating new ideas, products and ways of working. Marginson (2002) discovered that the interactive use of measurement can enhance the development of new ideas and thus improve

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, 63(2), 234-249.

innovation. Thus, ideation and general organization of operations can be facilitated through measurement. The hypothesis is as follows:

H2: Measurement moderates the relationship between ideation and organising structures and firm performance

Bititci et al. (2006) observe that the successful implementation and use of measurement leads to cultural change. There also results in the literature about beneficial effects of measurement on greater knowledge exchange among employees (Groen et al., 2012) and on communication and dialogue at all levels of organization (Tuomela, 2005; Henri, 2006). These may result in enhancement of organizational climate through measurement. The hypothesis is:

H3: Measurement moderates the relationship between work climate and wellbeing and firm performance

The review study of Franco-Santos et al. (2012) has discovered that measurement may have an impact on learning. Ukko et al. (2007) observe that the use of measurement improves the quality and content of the conversations managers have with employees, brings about new routines and enhances information sharing. It has also been shown that the interactive measurement enhances organizational learning (Henri, 2006) and thus know-how in organizations. Developing know-how can be assisted by measurement. Based on the above, the hypothesis is as follows:

H4: Measurement moderates the relationship between know-how development and firm performance

Based on Groen et al. (2012) measurement enabled employees to create new knowledge. In addition, the correct use of measurement can lead to an achievement culture (c.f., Bititci et al., 2006). The feedback use of performance measures significantly supports the exploitation of current capabilities, while the feed-forward use of performance measures supports the search for and identification of new capabilities (Grafton et al., 2010). All these effects of measurement are connected to regeneration. Thus, the following hypothesis can be formulated:

H5: Measurement moderates the relationship between regeneration and firm performance

Measurement can help improving coordination outside the organization with its partners (Franco-Santos et al., 2012). Henri (2006) shows that the interactive measurement fosters firm's orientation towards market requirements. Thus measurement assists the firm behavior of acquiring and exploiting information outside the firm. The hypothesis is as follows:

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, 63(2), 234-249.

H6: Measurement moderates the relationship between external knowledge and firm performance

The performance measurement system may also have a positive impact on an individual's performance and employee satisfaction (Lawson et al., 2003). In addition, the review study of Franco-Santos et al. (2012) reveal that measurement can have effect on employees' motivation, although it is dependent on the way measurement is used. Proper measurement can thus be used for increasing employees' activity. Based on the above, the hypothesis is as follows:

H7: Measurement moderates the relationship between individual activity and firm performance

3 Methodology

3.1 Variables

3.1.1 Independent variables

The independent variables of the study are participatory leadership culture, ideation and organizing structures, work climate and wellbeing, know-how development, regeneration, external knowledge, and individual activity. Each of these variables was measured by a five-point Likert-type scale, ranging from 1 (strongly disagree) to 5 (strongly agree). A neutral response—"neither disagree nor agree"—was adopted to reduce uninformed responses. Whenever possible, established scales were utilized. When the items had to be modified, the items were derived from the literature. The number of items in each variable and their references are presented in Table 1.

Table 1. Variable items and references.

Variable name	No of items	Measures	References
Innovation capability			
Participatory leadership culture	6	Encouragement	Wang and Ahmed (2004), Martensen et al. (2007), Kallio et al. (2012)
		Participation of managers Appreciation of employee knowledge and skills	Tang (1999) Dobni (2008), Ojala (2003), Martensen et al. (2007)
Ideation and organising structures	6	Ideation structures	Martensen et al. (2007)
		Feedback and rewards Work organizing	Tang (1999), Ojala (2003) Tang (1999), Ojala (2003)
Work climate and wellbeing	5	Co-operation	Kallio et al. (2012)
		Support and trust	Ojala (2003), Wang and Ahmed (2004)
		Mutual appreciation of all employees	Samson and Terziovski (1999), Dobni (2008)

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, 63(2), 234-249.

Know-how development	3	Creating possibilities for education Support for learning	Samson and Terziovski (1999), Calantone et al. (2002) Ojala (2003)
Regeneration	3	Activity towards new methods of action Tolerance of mistakes	Hurt et al. (1977), Wang and Ahmed (2004), Martensen et al. (2007) Dobni (2008)
External knowledge	3	Encouragement of acquiring knowledge outside an organization Developing actions and operations based on external knowledge	Martensen et al. (2007), Dobni (2008) Guan and Ma (2003), Dobni (2008), Kallio et al. (2012)
Individual activity	3	Employee activity Willingness to adopt new ways of action	Tang (1999), Kallio et al. (2012) Hurt (1977), Dobni (2008)
Measurement			
	9	Existence of innovation measures Focus of measures on innovation Use of innovation measures	McAdam and Keogh (2004) Tidd et al. (2005), Adams et al (2006) Skarzynski and Gibson (2008)
Firm performance			
	2	Financial Operational	Tangen (2004), Bueno et al. (2010) Tangen (2004), Bueno et al. (2010)

3.1.2 Moderator variable

There was no comprehensive scale on which to measure measurement related to innovation capability, therefore the items used had to be developed first. The items were rooted in literature. The moderator variable was measured by nine items (Table 1). The respondents were asked to respond to different questions: whether the organization has measures for evaluating development (1 item), which aspects of innovation capability are measured (7 items), and whether measurement information is used for developing the actions and operations of the organization (1 item). In this case, once again, a five-point Likert-type scale, ranging from 1 (strongly disagree) to 5 (strongly agree), was utilized.

3.1.3 Dependent variable

According to Bueno et al. (2010), the literature has established a high correlation between objective and subjective data on performance; therefore, both are valid when a firm's performance is calculated. In this study, subjective perceptions of the respondents were used to measure the dependent variable: firm performance. Based on previous literature, the term performance was divided to financial and operational performance. The respondents were asked to evaluate both the financial and operational (productivity, quality, etc.) performance of the company within the past three years on a scale of 1 (weak) to 4 (excellent).

3.1.4 Control variables

A total of three control variables were included: the industry and firm size (measured by two scales). A dummy variable was used for the industry, divided into manufacturing and service

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, 63(2), 234-249.

industries. Firm size was measured with a scale that asked the respondents to report the revenue of the firm in millions. Firm size was also measured by the number of employees in the firm.

3.2 Sample and data collection

A random sampling procedure was employed to draw a sample of 2400 Finnish SMEs employing 11–249 persons and having revenue of 2–50 million euro. SMEs with fewer than 10 employees were excluded from the sample. The web-based questionnaire targeted both the management and employee level of the SMEs. A total of 4800 questionnaires were sent. Of these questionnaires, 4050 reached the informants, while 750 questionnaires were returned to the researchers with return to sender (RTS) messages, indicating that the addresses were no longer valid. Three rounds of reminders were sent, each of them a week after the previous round. The final sample size was 311, reflecting a 7.68 per cent response rate.

To check for non-response bias, an analysis of variance (ANOVA) test was performed. The informants were divided into four groups: the first informants, the first follow-ups, the second follow-ups, and the third follow-ups. The results of the ANOVA test revealed that there was no significant difference (at the 5 per cent significance level) between the four groups. The results did not reveal any bias in the sample.

In terms of organizational size based on the number of employees, 72 per cent of the responses came from firms with 49 employees or fewer, and around 28 per cent were from firms with 50–249 employees. Based on revenue, around 45 per cent of the responses were from firms with 2–5 million euro revenue, around 43 per cent from firms with 5–20 million euro revenue, and around 11 per cent from firms with 20–50 million euro revenue. Among the 311 responses, 71.4 per cent were executives, and the rest were employees. About 47 per cent of the responses came from the industrial sector and about 51 per cent from the service sector.

4 Results

The validity of the variables was examined prior to hypothesis testing. Although the determinants of innovation capability are theoretically distinguishable constructs, factor analyses (FA) were conducted. The seven scales were subjected to principal component analysis to test the unidimensionality of the constructs and to eliminate unreliable items. One item was excluded, because it loaded alone among other items into one factor. The final results of the FA (Table 2) for the determinants of innovation capability indicated that the measurement items had strong loadings on the constructs they were supposed to measure, thereby demonstrating unidimensionality. To test the reliability of the results, a Cronbach's alpha test was performed. The alpha values of six factors, as shown in Table 2, were greater than 0.60. In one factor (individual activity), the alpha value was less than 0.50, which indicates that the reliability of the factor can be questioned, and therefore the results concerning the

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, 63(2), 234-249.

factor should be handled circumspectly. Table 3 presents the intercorrelations of the variables. The variance inflation factors (VIF) were computed to assess whether multicollinearity was a concern in the sample. All VIF values were well below the cut-off value of 10, indicating that multicollinearity did not cause problems.

Table 2. Descriptive statistics and results of FA and reliability tests.

Item	No of items	Mean	Std. Dev.	Factor loadings	Cronbach's alpha
Participatory leadership culture	6	3.65	0.613	0.573-0.776	0.803
Ideation and organising structures	6	3.45	0.628	0.484-0.772	0.708
Work climate and wellbeing	5	3.94	0.597	0.704-0.807	0.786
Know-how development	3	3.76	0.783	0.778-0.843	0.738
Regeneration	3	3.80	0.784	0.799-0.869	0.766
External knowledge	3	3.96	0.733	0.731-0.797	0.625
Individual activity	3	3.59	0.612	0.570-0.764	0.486
Measurement	9	3.20	0.726	0.531-0.772	0.851
Firm performance	2	2.68	0.713	0.891-0.891	0.731

Table 3. Correlations of the variables.

	1	2	3	4	5	6	7	8
Independent variables								
1 External knowledge								
2 Work climate and wellbeing	0.286***							
3 Ideation and organising structures	0.260***	0.556***						
4 Regeneration	0.390***	0.420***	0.419***					
5 Participatory leadership culture	0.273***	0.627***	0.559***	0.511***				
6 Individual activity	0.162***	0.386***	0.304***	0.379***	0.410***			
7 Know-how development	0.219***	0.483***	0.498***	0.394***	0.487***	0.308***		
Moderator variable								
8 Measurement	0.255***	0.398***	0.566***	0.379***	0.416***	0.278***	0.455***	
Dependent variable								
9 Firm performance	0.006	0.109+	0.225***	0.056	0.012	0.088	0.187**	0.122*

Sign. *** ≤ 0.001 , ** $0.001 < p \leq 0.01$, * $0.01 < p \leq 0.05$, + $0.05 < p \leq 0.1$

Table 4 presents the results of the moderation test. When the multiplicative items (determinants of innovation capability * firm performance) were entered in the model, the model was found to be significant (Sign. 0.000), with 15.9 per cent of the variance in firm performance explained.

The effect of exploitation of external knowledge is most significant ($\beta = 1.356$). When the multiplicative items were entered in regression one by one, none of the determinants alone was significant, but the determinants of innovation capability, together with measurement, had an effect on firm performance. The hypotheses propose a moderating effect of measurement on the relationship between innovation capability and firm performance. As shown above, the results support the hypothesis 6. Consistent with the predictions, the link between innovation capability and firm performance is, indeed, strong in the presence of measurement.

Table 4. The results of moderator analyses.

Dependent variable	Firm performance	
	Beta	t
Revenue	0.247	3.542***
No of employees	-0.257	-3.552***
Industry	0.063	1.002
Determinants of innovation capability		
External knowledge (IN1)	-0.804	-2.147*
Work climate and wellbeing (IN2)	0.483	1.101
Ideation and organising structures (IN3)	0.222	0.637
Regeneration (IN4)	0.054	0.161
Participatory leadership culture (IN5)	-0.100	-0.247
Individual activity (IN6)	0.087	0.210
Know-how development (IN7)	0.303	1.108
Measurement (MEAS)	0.213	0.525
IN1* MEAS	1.356	2.080*
IN2* MEAS	-1.035	-1.052
IN3* MEAS	0.108	0.157
IN4* MEAS	-0.111	-0.190
IN5* MEAS	-0.213	-0.261
IN6* MEAS	-0.011	-0.014
IN7* MEAS	-0.364	-0.718
F		2.725***
R		0.398
R ²		0.159
R ² Change		0.159***
F Change		2.725***

Sign. *** ≤ 0.001 , ** $0.001 < p \leq 0.01$, * $0.01 < p \leq 0.05$, + $0.05 < p \leq 0.1$

5 Discussion

The findings support the conception that the positive impact of the exploitation of external knowledge on firm performance is moderated by performance measurement. Further, the results do not indicate the significant moderating effect of performance measurement related to other determinants of innovation capability. Beyond providing empirical support for the innovation capability-firm performance relationship, this study confirms the role of performance measurement as an important moderating link. This role can also be confirmed by taking the entire model under examination.

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, 63(2), 234-249.

The model indicates an interesting result, in which exploitation of external knowledge has a negative and significant effect on firm performance, whereas the effect is significant and positive when it is moderated by performance measurement. Instead of focusing purely on the internal aspects of innovation capability, the external aspects seem to have a most significant positive impact on the firm performance when moderated by performance measurement. In earlier literature, the organization's ability to acquire outside knowledge and to collaborate externally is stated to be key to its innovative success (c.f., Swink, 2006). Further, the strength of inter-firm relationships influences the extent of tacit knowledge transfer, and the tacit knowledge obtained from partner firms affects a firm's innovation capability (Cavusgil et al., 2003). The earlier studies (c.f., Lawson and Samson, 2001; Romijn and Albaladejo, 2002) have also indicated that interaction with suppliers, customers, industry associations, competitors, and the like can provide missing external inputs that the organization itself cannot provide. However, the current study indicates that, without the moderating effect of performance measurement, the impact of the exploitation of external knowledge for firm performance is negative. It can thus be stated that the challenges of exploiting external knowledge can be mastered through measurement. When the exploitation of external knowledge becomes more systematic and monitored, external knowledge may become more beneficial for the firm when achieving better performance. In turn, it seems that, when the performance measurement does not exist, the attempts to utilize external knowledge and best practices are ineffective without a clear focus and target or the ability to channel the resources to appropriate initiatives.

When focusing on the six other, more internal determinants of innovation capability, the significant moderating effect of performance measurement on firm performance does not exist. The nature of these determinants is more multiform in comparison, for example, to benchmarking the best practices, and the development results of these determinants usually occur gradually. The performance measurement initiatives, even the sophisticated ones, do not intrinsically guarantee a direct impact on firm performance. For example, individual activity and know-how development related to innovation capability and innovations require supporting tools to enable an idea generation pipeline (Skarzynski and Gibson, 2008) as well as proper organizational structures and systems (Lawson and Samson, 2001) before they can be realized as a firm asset. The results thus indicate that the performance measurement could be focused on not only the determinants of innovation capability but also the processes that link the individual innovation capabilities to the organizational innovation capabilities and further to firm performance.

Bourne et al. (2003) conclude that performance measurement has an impact on the environment in which it operates. According to Pavlov and Bourne (2011), the impacts of performance measurement depend on the way such measurement is used. For example, Ukko et al. (2007, 2008) present many positive impacts of performance measurement on the different aspects of management, leadership, and quality of working life, which indirectly enhance the firm

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, 63(2), 234-249.

performance in the long run. This study has not taken into consideration what type of measurement moderates the relationship between innovation capability and firm performance. However, it can be assumed that the type of measurement may affect the impact of measurement in the relationship between innovation capability and firm performance. When measurement is used in its feed-forward function, it can affect the direction of the change in organizational processes (Pavlov and Bourne, 2011). The results of this study show that measurement can facilitate this direction of change and assist in developing the exploitation of external knowledge-firm performance relationship.

A relationship exists between innovation capability and firm performance, but the connection is still challenging. Although the current study does not present the way the measurement is used, it confirms that the SMEs have succeeded in such measurement as regards the exploitation of external knowledge. Measurement can have positive effects on this relationship; thus, measurement can be used as a tool for developing and monitoring the exploitation of the external knowledge-firm performance relationship.

6 Conclusions

This article has presented the results of a study investigating the moderating effects of performance measurement in the relationship between the determinants of innovation capability and organizational performance. The results show that measurement partly moderates the relationship. Firms that measure the determinants of innovation capability, especially through active exploitation of external knowledge, are more likely to engage in a higher level of innovation capability, which in turn has a positive impact on their performance. Performance measurement can thus be used as a tool for improving SME performance through innovation capability.

There are some limitations to the study that should be acknowledged. The data used in the study were collected with subjective measures based on the perceptions of companies' managers and employees. Although perceptual data is extensively used in business studies, there is a possibility that the subjectivity of the measures has biased the results of the study. In addition, a majority of the responses came from managers. Thus, managers' opinions are emphasized in the results. Finally, the study is based on data from a single country. The specific country characteristics should be taken into account when the results are applied to practice or further studies. The sample covered a large portion of Finnish SMEs employing 11–249 people and having revenue of 2–50 million euro. The results can thus be considered to be generalized to SMEs at least in Finland. For further research, in-depth studies are needed to clarify how the SMEs use the performance measurement to manage performance through external knowledge. Regarding the other determinants of innovation capability, it would be interesting to discover whether the measurement is focused more on the single determinants or on the process that transfers the innovation capability to firm performance. The presumption for further research

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, 63(2), 234-249.

can be that measurement can have positive effects when it has been conducted in a way that concurrently takes into account the determinants, process, and performance aspects of innovation capability. In this way, measurement could be considered a useful link for SMEs in their attempts to manage such a multifaceted construct as innovation capability, in order to achieve higher performance. Further research could also study the type of measurement and measures that are most effective when the relationship between innovation capability and performance are facilitated through measurement.

References

Adams, R., Bessant, J. and Phelps, R. (2006), "Innovation management measurement: A review", *International Journal of Management Reviews*, Vol. 8, No. 1, pp. 21–47.

Akman, G. and Yilmaz, C. (2008), "Innovative capability, innovation strategy and market orientation: an empirical analysis in Turkish software industry", *International Journal of Innovation Management*, Vol. 12, No. 1, pp. 69–111.

Bessant, J. (2003), *High-Involvement Innovation: Building and Sustaining Competitive Advantage Through Continuous Change*, Chichester, John Wiley & Sons.

Bisbe, J. and Otley, D. (2004), "The effects of the interactive use of management control systems on product innovation", *Accounting, Organisations and Society*, Vol. 29, No. 8, pp. 709–737.

Bititci, U.S., Mendibil, K., Nudurupati, S., Garengo, P. and Turner, T. (2006), "Dynamics of performance measurement and organisational culture", *International Journal of Operations & Production Management*, Vol. 26, No. 12, pp. 1325–1350.

Bourne, M., Neely, A., Mills, J. and Platts, K. (2003), "Implementing performance measurement systems: a literature review", *International Journal of Business Performance Management*, Vol. 5, No. 1, pp. 1–24.

Bowen, F.E., Rostami, M. and Steel, P. (2010), "Timing is everything: A meta-analysis of the relationships between organisational performance and innovation", *Journal of Business Research*, Vol. 63, No. 11, pp. 1179–1185.

Bueno, E., Aragón, J.A., Paz Salmador, M. and García, V.J. (2010), "Tangible slack versus intangible resources: the influence of technology slack and tacit knowledge on the capability of organisational learning to generate innovation and performance", *International Journal of Technology Management*, Vol. 49, No. 4, pp. 314–337.

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, 63(2), 234-249.

Cainelli, G., Evangelista, R. and Savona, M. (2004), "The impact of innovation on economic performance in services", *Service Industries Journal*, Vol. 24, No. 1, pp. 116–130.

Calantone, R.J., Cavusgil, S.T. and Zhao, Y. (2002), "Learning orientation, firm innovation capability, and firm performance", *Industrial Marketing Management*, Vol. 31, No. 6, pp. 515–524.

Cavusgil, S.T., Calantone, R.J., Zhao, Y. (2003), "Tacit knowledge transfer and firm innovation capability", *Journal of Business & Industrial Marketing*, Vol. 18, No. 1, pp. 6–21.

Cruz, I., Scapens, R.W. and Major, M. (2011), "The localisation of a global management control system", *Accounting, Organizations and Society*, Vol. 36, No. 7, pp. 412–427.

de Leeuwa, S. and van den Berg. J.P. (2011), "Improving operational performance by influencing shopfloor behavior via performance management practices", *Journal of Operations Management*, Vol. 29, No. 3, pp. 224–235.

Dobni, C.B. (2008), "Measuring innovation culture in organisations, The development of a generalized innovation culture construct using exploratory factor analysis", *European Journal of Innovation Management*, Vol. 11, No. 4, pp. 539–559.

Franco-Santos, M., Lucianetti, L. and Bourne, M. (2012), "Contemporary performance measurement systems: A review of their consequences and a framework for research", *Management Accounting Research*, Vol. 23, pp. 79–119.

Grafton, J., Lillisa, A.M. and Widener, S.K. (2010), "The role of performance measurement and evaluation in building organisational capabilities and performance", *Accounting, Organizations and Society*, Vol. 35, No. 7, pp. 689–706.

Groen, B.A.C., van de Belt, M. and Wilderom, C.P.M. (2012) "Enabling performance measurement in a small professional service firm", *International Journal of Productivity and Performance Management*, Vol. 61, No. 8, pp. 839–862.

Guan, J. and Ma, N. (2003), "Innovative capability and export performance of Chinese firms", *Technovation*, Vol. 23, No. 9, pp. 737–747.

Gunday, G., Ulusoy, G., Kilic, K. and Alpkan, L. (2011), "Effects of innovation types on firm performance", *International Journal of Production Economics*, Vol. 133, No. 2, pp. 662–676.

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, 63(2), 234-249.

Hall, M. (2008), "The effect of comprehensive performance measurement systems on role clarity, psychological empowerment and managerial performance", *Accounting, Organizations and Society*, Vol. 33, Iss. 2-3, pp. 141–163.

Henri, J-F. (2006), "Organizational culture and performance measurement systems", *Accounting, Organizations and Society*, Vol. 31, pp. 77–103.

Hult, G.T.M., Hurley, R.F. and Knight, G.A. (2004), "Innovativeness: Its antecedents and impact on business performance", *Industrial Marketing Management*, Vol. 33, No. 5, pp. 429–438.

Hurt, T.H., Joseph, K. and Cook, C.D. (1977), "Scales for the measurement of innovativeness", *Human Communication Research*, Vol. 4, No. 1, pp. 58–65.

Jiménez-Jiménez, D. and Sanz-Valle, R. (2011), "Innovation, organisational learning, and performance", *Journal of Business Research*, Vol. 64, No. 4, pp. 408–417.

Kallio, A., Kujansivu, P. and Parjanen, S. (2012), "Locating the loopholes of innovation capability before launching development project", *Interdisciplinary Journal of Information, Knowledge, and Management*, Vol. 7, No. 1, pp. 21–38.

Keskin, H. (2006), "Market orientation, learning orientation, and innovation capabilities in SMEs – An extended model", *European Journal of Innovation Management*, Vol. 9, No. 4, pp. 396–417.

Kohlbacher, M. and Gruenwald, S. (2011), "Process ownership, process performance measurement and firm performance", *International Journal of Productivity and Performance Management*, Vol. 60, No. 7, pp. 709–720.

Laforet, S. (2011), "A framework of organisational innovation and outcomes in SMEs", *International Journal of Entrepreneurial Behaviour & Research*, Vol. 17, No. 4, pp. 380–408.

Lawson, B. and Samson, D. (2001), "Developing innovation capability in organisations: a dynamic capabilities approach", *International Journal of Innovation Management*, Vol. 5, No. 3, pp. 377–400.

Lawson, R., Stratton, W. and Hatch, T. (2003), "The benefits of a scorecard system", *CMA Management*, Jun/Jul, pp. 24–26.

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, 63(2), 234-249.

Lloréns Montes, F.J., Ruiz-Moreno, A. and García Morales, V. (2005), "Influence of support leadership and teamwork cohesion on organisational learning, innovation and performance: an empirical examination", *Technovation*, Vol. 25, No. 10, pp. 1159–1172.

Marginson, D.E.W. (2002), "Management control systems and their effects on strategy formation at middle-management levels: evidence from a UK organization", *Strategic Management Journal*, Vol. 23, No. 11, pp. 1019–1031.

Martensen, A., Dahlgaard, J.J., Park-Dahlgaard, S.M. and Grønholdt, L. (2007) , "Measuring and diagnosing innovation excellence – simple contra advanced approaches: a Danish study", *Measuring Business Excellence*, Vol. 11, No. 4, pp. 51–65.

Martínez-Román, J.A., Gamero, J. and Tamayo, J.A. (2011), "Analysis of innovation in SMEs using an innovative capability-based non-linear model: A study in the province of Seville (Spain)", *Technovation*, Vol. 31, No. 9, pp. 459–475.

Mazzanti, M., Pini, P. and Tortia, E. (2006), "Organisational innovations, human resources and firm performance: The Emilia-Romagna food sector", *Journal of Socio-Economics*, Vol. 35, Iss. 1, pp. 123–141.

McAdam, R. and Keogh, W. (2004), "Transitioning Towards Creativity and Innovation Measurement in SMEs", *Creativity and Innovation Management*, Vol. 13, No. 2, pp. 126–139.

Neely, A., Filippini, R., Forza, C., Vinelli, A., Hii, J. (2001), "A framework for analysing business performance, firm innovation and related contextual factors: perceptions of managers and policy makers in two European regions", *Integrated Manufacturing Systems*, Vol. 12. No. 2, pp. 114–124.

Olsson, A., Wadell, C., Odenrick, P. and Bergendahl, M.N. (2010), "An action learning method for increased innovation capability in organisations", *Action Learning: Research & Practice*, Vol. 7, No. 2, pp. 167–179.

Otala, L. (2003). *Welfare to workplace – outcome to the action*. Helsinki: WSOY (in Finnish).

Paalanen, A., Kujansivu, P., Parjanen, S. (2009), "Measuring the effects of an innovation-focused intervention", Paper presented at the XX ISPIM Future of Innovation Conference, June 2009, Vienna, Austria.

Pavlov, A. and Bourne, M. (2011), "Explaining the effects of performance measurement on performance: An organisational routines perspective", *International Journal of Operations & Production Management*, Vol. 31, No. 1, pp. 101–122.

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, 63(2), 234-249.

Perdomo-Ortiz, J., González-Benitoa, J. and Galende, J. (2006), "Total quality management as a forerunner of business innovation capability", *Technovation*, Vol. 26, No. 10, pp. 1170–1185.

Prajogo, D.I. and Ahmed, P.K. (2006), "Relationships between innovation stimulus, innovation capacity, and innovation performance", *R&D Management*, Vol. 36, No. 5, pp. 499–515.

Radnor, Z.J. and Barnes, D. (2007), "Historical analysis of performance measurement and management in operations management", *International Journal of Productivity and Performance Management*, Vol. 56, No. 5, pp. 384–396.

Rheea, J., Parkb, T. and Lee, D.H. (2010), "Drivers of innovativeness and performance for innovative SMEs in South Korea: Mediation of learning orientation", *Technovation*, Vol. 30, No. 1, pp. 65–75.

Romijn, H., Albaladejo, M. (2002), "Determinants of innovation capability in small electronics and software firms in southeast England", *Research Policy*, Vol. 31, No. 7, pp. 1053–1067.

Rosenbusch, N., Brinckmann, J. and Bausch, A. (2011), "Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs", *Journal of Business Venturing*, Vol. 26, No. 4, pp. 441–457.

Samson, D. and Terziovski, M. (1999), "The relationship between total quality management practices and operational performance", *Journal of Operations Management*, Vol. 17, No. 4, pp. 393–409.

Saunila, M. (forthcoming). The role of innovation capability in achieving higher performance", Working paper.

Saunila, M. and Ukko, J. (2011), "Facilitating innovation capability through performance measurement", Paper presented at the 6th Conference on Performance Measurement and Management Control, 7 - 9 September 2011, Nice, France.

Silva, M.J.M., Simões, J., Moreira, J., and Sousa, G. (2012), "Investment and Expenditure on Innovation Activities and Innovative Capability: Empirical Evidence from Portuguese Services Firms and KIBS", *International Business Research*, Vol. 5, No. 2, pp. 114–122.

Skarzynski, P. and Gibson, R. (2008). *Innovation to the Core: a blueprint for transforming the way your company innovates*. Boston: Harvard Business School Press.

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, 63(2), 234-249.

Smith, M., Busi, M., Ball, P. and van der Meer, R. (2008), "Factors influencing an organisation's ability to manage innovation: a structured literature review and conceptual model", *International Journal of Innovation Management*, Vol. 12, No. 4, pp. 655–676.

Swink, M. (2006), "Building Collaborative Innovation Capability", *Research-Technology Management*, Vol. 49, No. 2, pp. 37–47.

Tang, H.K. (1999), "An inventory of organisational innovativeness", *Technovation*, Vol. 19, No. 1, pp. 41–51.

Tangen, S. (2004), "Performance measurement: from philosophy to practice", *International Journal of Productivity and Performance Management*, Vol. 53, No. 8, pp. 726–737.

Teeratansirikool, L., Siengthai, S., Badir, Y. and Charoenngam, C. (2013), "Competitive strategies and firm performance: the mediating role of performance measurement", *International Journal of Productivity and Performance Management*, Vol. 62, No. 2, pp. 168–184.

Tidd, J., Bessant, J. and Pavitt, K. (2005), *Managing innovation: Integrating Technological, Market and Organisational Change*, West Sussex, England, John Wiley & Sons.

Tuomela, T. (2005), "The interplay of different levers of control: a case study of introducing a new performance measurement system", *Management Accounting Research*, Vol. 16, pp. 293–320.

Tuominen, M. and Hyvönen, S. (2004), "Organisational Innovation Capability: A Driver for Competitive Superiority in Marketing Channels", *The International Review of Retail, Distribution and Consumer Research*, Vol. 14, No. 3, pp. 277–293.

Tura, T., Harmaakorpi, V. and Pekkola, S. (2008), "Breaking Inside the Black Box: Towards a Dynamic Evaluation Framework of Regional Innovative Capability", *Science and Public Policy*, Vol. 35, No. 10, pp. 733–744.

Ukko, J., Tenhunen, J. and Rantanen, H. (2008), "The impacts of performance measurement on the quality of working life", *International Journal Business Performance Management*, Vol. 10, No.1, pp. 86–98.

Ukko, J., Tenhunen, J. and Rantanen, H. (2007), "Performance measurement impacts on management and leadership: Perspectives of management and employees", *International Journal of Production Economics*, Vol. 110, No. 1–2, pp. 39–51.

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, 63(2), 234-249.

van der Stede, W.A., Chow, C.W. and Lin, T.W. (2006), "Strategy, Choice of Performance Measures, and Performance", *Behavioral Research in Accounting*, Vol. 18, No. 1, pp. 185–205.

Walker, R.M., Damanpour, F. and Devece, C.A. (2011), "Management Innovation and Organisational Performance: The Mediating Effect of Performance Management", *Journal of Public Administrations Research and Theory*, Vol. 21, No. 2, pp. 367–386.

Wang, C.L. and Ahmed P.K. (2004), "The development and validation of the organisational innovativeness construct using confirmatory factor analysis", *European Journal of Innovation Management*, Vol. 7, No. 4, pp. 303–313.