

EXAMINING THE MODERATORS OF INNOVATION CAPABILITY AND FIRM PERFORMANCE: A META-ANALYSIS OF THE EMPIRICAL EVIDENCE

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Abstract

This study examines the possible moderators of innovation capability and firm performance. This study used a meta-analysis to synthesize empirical findings in order to obtain evidence about the magnitude of the relationship. Bivariate analysis was used to identify the significant association of knowledge management, learning, R&D, market orientation, organizational culture towards innovation capability, and its impact on performance. Meta-regression was used to identify the sample characteristics as moderators in the study. Results suggest that organizational factors have a significant effect on innovation capability compared to knowledge factors. Also, organizational culture has the highest impact on innovation capability than other determinants. Furthermore, firm type and size as moderators have an influence on innovation capability-firm performance. The study recommends that organizations should focus more on organizational factors, especially organizational culture to improve their innovation capability. Also, the type of firm type and size as moderators can influence innovation capability-performance relationship.

Keywords: Innovation Capability, Performance, Meta-analysis, Organizational culture, Organization factors, Knowledge factors

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INTRODUCTION

The growing interest of innovation in many industries has opened up the understanding of innovation, which is not limited to technologies alone, but to other resources (i.e., knowledge) in the organisation (Rajapathirana & Hui, 2017). Innovation is widely studied in research and a key factor for strengthening business competitiveness (Mir, Casadesus & Petnji, 2016). It is a means through which organisations strive to design new products, processes and systems in order to experience growth, high quality, high sales, increased productivity, customer satisfaction and larger market share (Nada & Ali, 2015; Yang, Zhang & Ding, 2015). With this, organisations endeavour to sustain innovation by developing their capability to innovate (Yang *et al.*, 2015).

Innovation capability is one of the main factors contributing to the study of innovation (Martinez-Roman, Gamero & Tamayo, 2011). It is also a multi-faceted construct that is defined from various perspectives (Saunila, Pekkola & Ukko, 2014). However, empirical research on innovation capability

examined the study as a determinant or an influence (Saunila *et al.*, 2014; Yang *et al.*, 2015) as a result of the available resources that contributes to an organisation's innovation capability (Wang & Dass, 2017). Notwithstanding the extensive research on innovation capability, studies have established a relationship with performance (Calantone, Cavusgil & Zhao, 2002; Guan & Ma, 2003; Raymond, Bergeron & Croteau, 2013; Saunila *et al.*, 2014); and reports revealed the significance and generality of innovation capability-performance relationship to be positive across studies, however, the moderation of firm type, size, and age across the research stream is mixed (Damanpour, 1991; Calantone *et al.*, 2002; Saunila & Ukko, 2014). This article wants to conduct a meta-analytical review of primary quantitative studies of the relationship between innovation capability and performance. The objective of the study is to examine whether firm type and size can moderate the relationship between innovation capability and performance.

The article contributes to the literature in different ways. First, the study becomes an empirical database for other scholars interested in innovation capability and performance. Second, the study provides insight into the magnitude of the relationship between innovation capability and performance. Third, the use of meta-analysis as a methodological approach identified the significance of the moderators in the study.

Literature Review

Innovation Capability

Innovation is key to most organisations that want to improve their business because it brings about changes in the organisation and business environment in terms of customer demands, increased competition, technological change and new market (Damanpour & Evan, 1984; Yang *et al.*, 2015). Innovation can occur only if the organisation has the capability to innovate (Matinez-Roman *et al.*, 2011; Dadfar *et al.*, 2013; Saunila & Ukko, 2014; Rajapathirana & Hui, 2017). Thus, innovation capability is the main contributing factors in the study of innovation (Matinez-Roman *et al.*, 2011). Scholarly reviews on innovation capability have a broad spectrum on the definition of innovation capability (Saunila, Pekkola & Ukko, 2014; Yaghoubi *et al.*, 2017). For instance, Adler and Shenbar (1990) explained innovation capability as the ability to meet market needs, design a new product, process and process in order to respond to the unexpected activities of competitors. Kogut and Zander (1992) explained innovation capability as the ability to mobilize knowledge to produce new knowledge that leads to product or process innovation.

Burgelman, Maidique and Wheelwright (2004) defined innovation capability as the set of organisational characteristics that supports and facilitates innovation strategies. Saunila (2014) defined innovation capability as the ability of the organisation to perform innovative activities through the procedures and processes affecting the organization. With this, innovation capability is considered to relate to market needs, knowledge, product, process and technology. It is the organisation's ability to adapt, transform or generate innovative activities using necessary knowledge, skill or resources to answer properly to changes in the business environment and consistently deliver value to both customer and society.

Definition of Performance

Performance is a vital part of management for measuring various aspects of the organization such as profitability, productivity, quality, personnel development, customer satisfaction and innovation (Saunila *et al.*, 2014, Saunila, 2016, Zulfikar, Kartini, Suryana & Mulyana, 2017). It is critical for the

management of any organization, thus, Saunila (2016) note that performance measurement can be related either to results (i.e., financial performance) or determinants of result (i.e., quality and innovation). Venkatraman and Ramanujam (1986) in his review gave a broader conceptualization of performance to entail financial and non-financial/operational performance. Financial performance includes: profitability (i.e., return on investment, return on equity, net income), market value (i.e., earnings per share, stock price improvement, market value), and growth (i.e., sales growth, net income growth, market share growth) (Venkatraman & Ramanujam, 1986; Santos & Brito, 2012) Operational (non-financial) performance is multifunctional discipline that traditionally focused on productivity that is, labor productivity (Neely, 2002), but recently, operational performance focus on business processes such as quality, brand equity, market share, innovative potential, employees' satisfaction, customers' satisfaction and shareholders' satisfaction (Venkatraman & Ramanujam, 1986; Zulfikar *et al.*, 2017).

Theoretical framework

Innovation capability leverages on the resource-based view (RBV), which rests upon the premises of resources and capability. It focuses on the firm's ability to position itself for competitive advantage and superior performance (Grant, 1999). Barney (1991) considers assets, capabilities, organisational processes and knowledge as attributes of a firm resource, however, Grant (1999) distinct between resources from capabilities by defining resources as the basic input and source for a firm's capability, and capability as the ability to use available resources to gain competitive advantage and achieve superior performance.

Focusing on the framework guided by theoretical discussion in figure 1, the framework depicts the relationship among the most frequently examined antecedents and consequences of innovation capability. The framework is based on the work of Martinez-Roman *et al.* (2011) and Yang *et al.* (2015). Martinez-Roman *et al.* (2011) considered knowledge, organisation and human factor while Yang *et al.* (2015) considered process, organisation and knowledge. However, the resource-based theory considers all attributes, thus, this research would consider knowledge and organisation as dimensions of innovation capability for this meta-analysis.

Antecedents of Innovation Capability

Knowledge Factors

Organisational Learning: Extensive research on learning distinguished between organisational learning and learning orientation (Baker & Sinkula, 1999; Mavondo, Chimhanzi & Stewart, 2005). However, organisations that facilitate organisation learning tend to embrace learning orientation (Baker & Sinkula, 1999; Lee & Tsai, 2005); thus, studies on organizational learning explicate the dimensions as open-mindedness, shared vision, commitment to learning and intra-organisational knowledge sharing are antecedent to innovation capability (Baker and Sinkula, 1999; Calantone *et al.*, 2002) while other empirical evidence have seen organisation learning not central to innovation but to other organisational activities such as performance (Noruzy, Dalfard, Azhdari, Nazari-Shirkouhi & Rezazadeh, 2013). Thus, organisational learning has shown a strong relationship with a firm innovation capability (Calantone *et al.*, 2002).

Knowledge Management: Knowledge management is considered a valuable resource, but other components of knowledge management (i.e., knowledge transfer, knowledge sharing, tacit knowledge and knowledge process) have also been a focus in research. For instance, studies on knowledge sharing have been positively related to innovation capability (Chen and Haung, 2009; Wand and Wang, 2012;

Lin, 2017), particularly when the top management encourages their employees to willingly share knowledge and not through organisational rewards (Lin, 2017). The role of knowledge management has been frequenting in innovation research with other indicators; however, knowledge management is considered to positively affect innovation capability (Darroch, 2005; Liao & Wu, 2010).

Research and Development (R&D): R&D has received much attention from researchers as it stems mostly from external knowledge (Leonard-Barton, 1992; Czarntzki & Kraft, 2006). Extensive research has addressed the issue of R&D on the innovativeness of an organisation and appears to favor R&D mostly in the high-technology manufacturing sector (Thornhill, 2006; Fosfuri & Tribo, 2008). Although, other empirical evidence suggests that the relationship may be undesirable (Czarntzki and Kraft, 2006; Krishnan, Tadepalli and Daewoo, 2009). However, R&D has shown to have a consistent positive association with a firm innovation capability (Thornhill, 2006; Fosfuri & Tribo, 2008).

Organisation Factors

Organisational Culture: Organisational culture is important for the operative of the organisation (Martins & Terblanche, 2003). Studies classified organisational culture into categories (e.g., Hofstede, 1983; Cameron and Quinn, 1999) and characteristics (e.g., team orientation, members' participation, empowerment etc.). Organisational culture influences the degree to which innovation takes place in the organisation, and empirical research has established organisational culture to have a positive association with innovation capability (Cakar & Erturk, 2010; Uzokurt, Kamar, Kimzan & Eminoglu, 2013). Furthermore, the different characteristics of organisational culture such as team orientation, people orientation, empowerment and other cultural characteristics are empirically researched to support organisational activities (i.e., product, service or process innovation) based on the types of innovation they foster (Jaskyte & Dressler, 2005; Cakar & Erturk, 2010).

Market Orientation: Organisations have the ability to gather knowledge about customers, competitors and market at large (Mavondo et al., 2005; Morgan & Berthon, 2008). It enables the organisation to make the right decision and respond to the information in an innovative way (Mavondo et al., 2005; Morgan & Berthon, 2008). With this, we establish based on empirical findings that market orientation has a positive association with innovation capability.

Consequences of Innovation Capability

The categorization of the consequences of innovation capability is adapted from the work of Venkatraman and Ramanujam (1986) who categorized performance as financial and non-financial/operating performance. Scholarly reviews (Calantone et al., 2002; Guan & Ma, 2003; Saunila et al., 2014; Dalvand et al., 2015; Ramanathan, Ramanathan & Bentley, 2018) considered various indicators of non-financial and financial performance. The empirical review on non-financial performance (i.e., market share, new product success, customer satisfaction) has shown to have a positive correlation with innovation capability. Empirical review (Raymond et al, 2013; Mir et al., 2016; Ramanathan et al., 2018) on financial performance (i.e., growth, profitability, return on investment (ROI)) is shown to also have a positive correlation with innovation capability. However, Raymond et al. (2013) note that the effect of innovation capability on financial performance is more significant in large firms (such as I.T firms), and non-financial performance on small firms.

Schematic Model of the Study

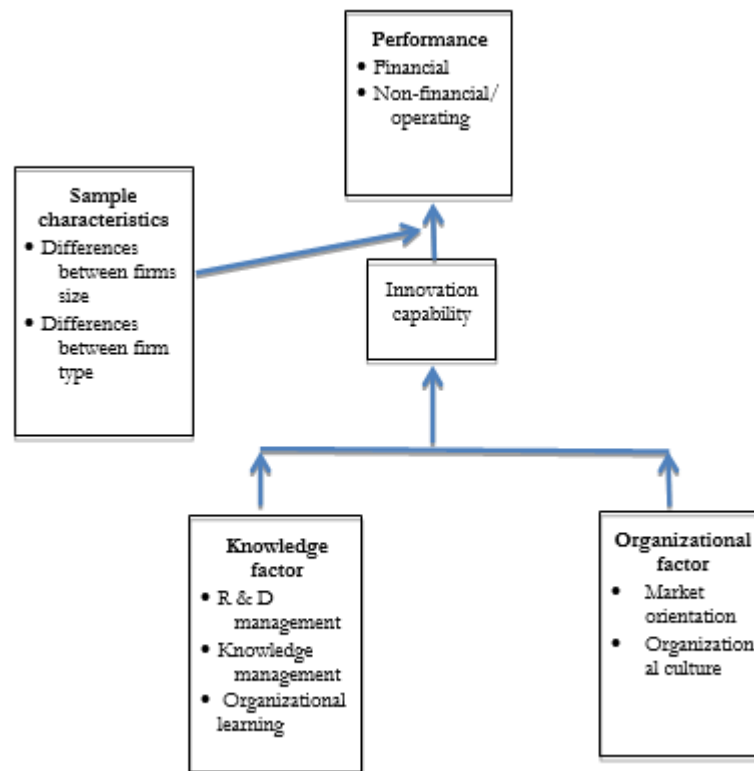


Figure 1: Framework for Meta-Analysis

Source: Own Elaboration

Research Hypotheses

Innovation Capability and Performance

Innovation capability has received much interest in literature. It is identified as an engine of growth that impacts the organization in terms of increased sales, profit, market share and competitive advantage. Empirical findings reveal that firms tend to compete through their position in their preferred market when they have the capability to deploy their available resources. Hence, the result indicates that there is a direct and positive correlation between innovation capability and performance (Sok & Cass. 2011; Raymond et al., 2013; Saunila & Ukko, 2014).

Hypothesis 1: There is no significant relationship between innovation capability and performance.

Organisation Type

Organisations adopt an innovation to make and react to changes in the organisation and business environment (Damanpour & Evan, 1991). However, the capability to deploy their resources may be unevenly in the different types of organisation (i.e., manufacturing and service organization) (Damanpour, 1991; Hogan et al., 2011). Thus, scholars studied the relationship between innovation capability and performance with different organisation type and reported that differences exist in the organisation such as their nature of activities (Damanpour, 1991, Forsman, 2011). Their findings show

that the differences in innovation capability across manufacturing and service are statistically significant (Forsman, 2011; Saunila & Ukko, 2014).

Hypothesis 2: Firm type (manufacturing versus service) does not significantly moderate the relationship between innovation capability and performance.

Organisation Size

Organisation size is considered as the number of employees in an organization (Yasuda, 2005; Saunila *et al.*, 2014). Organisation size differentiates a small firm from a large firm (Wagner, 1994), and research on organisation size and innovation capability-performance relationship is found to be inconsistent (Terziowski, 2010). For instance, Acs and Audretsch (1987) in their research on firm size notes that small firms tend to have the capability to innovate compared to large firms, but due to their limited resources, Yasuda (2005) notes that small firms do not have a significant relationship with performance. However, Cohen, Levin and Mowery (1987) and Anderson and Eshima (2013) notes that firm size correlates with the available resources in the organisation, thus, large firms tend to have the capability to innovate and improve their performance.

Hypothesis 3: Firm size (large versus small) does not significantly moderate the relationship between innovation capability and performance.

Method

Database Development

A number of search strategies were utilized to identify studies that shows the relationship between innovation capability and performance. First, several articles on innovation capability and performance (e.g., Martinez-Roman *et al.*, 2011; Saunila & Ukko, 2012; Rajapathirana & Hui 2017) were studied. This gave a clearer view on the measures of innovation capability cited to have an impact on performance. With this, search on the database such as Science direct, Jstor and Google scholar was conducted for the independent and dependent variable using keywords: “innovation capability” and “performance”. The keywords further expatiated to generic and specific search terms. The sub-factor for the specific search term can be seen in appendix 2.

The search was not specific on the publication year and title as all the available years and title were searched. The search result can be seen in appendix 1.

Inclusion Criteria

The data collection process yielded a sample of 25 published studies from 1998 to 2018. Based on the guidelines of Hunter and Schmidt (2004), the inclusion criteria is vital in the meta-analysis study. Thus, the studies included in the meta-analysis are based on five criteria developed accordingly:

1. Studies that addressed the measures of innovation capability-performance relationship as their research question.
2. Studies that reported the r-family of effects (i.e., correlation coefficients) (Rosenthal, 1994) or values that could be converted into r (DeCoster, 2004). See Appendix 1.
3. Studies that have the same definition of variables used in the theoretical framework, even if a different terminology for the variable was used. For example, Chen and Haung (2009) used “Knowledge sharing” which is an indicator of knowledge management and Liao and Chang (2006) used “knowledge management”, which is also an indicator of knowledge management in the categories of innovation capability.

Applying these criteria to the study, a number of empirical studies did not report the necessary statistics, especially the *r*-family or values that could be converted into *r*. For instance, some studies were conceptual rather than empirical (Giniuniene & Jusksiene, 2015).

Some studies repeated the same data over various studies (Saunila & Ukko, 2013; Saunila, Pekkola & Ukko, 2014, Wang & Wang, 2012; Wang, Wang & Liang, 2014). Some studies reported only multivariate models such as regression or path coefficient, which could not be converted to *r* (Cavugil, Calantone & Zhao, 2003; Liao, Chang, Hu & Yueh, 2012). With this, the total number of 20 studies could not be included in the analysis with the preceding reasons.

Data Coding

The report for effect size metric was the zero-order Pearson product-moment correlation coefficient (Rosenthal, 1994), and for studies that did not report correlations coefficient, other procedures were reported such as means and standard deviation, *t*-test 1 *df* *F* statistic, and simple linear regression; they were converted to correlation coefficient (DeCoster, 2004) using Wilson’s effect size calculator as suggested by Field & Gillett (2010). The report was coded twice to reconcile any inconsistencies in the article. The article also coded and reported multiple independent samples found in the studies separately. The procedures on the specific study characteristics to code for the meta-analytical report were based on the report of Brown and Peterson (1993) and DeCoster (2004).

Results and Findings

Table 1: Bivariate Meta-Analytical Results

	k	N	<i>r</i>	Confidence interval		Z-value	p-value	Q-value	I-squared
Antecedents of innovation capability									
Knowledge factor	21	5,819	0.194	0.147	0.239	8.022	0.00	70.581	71%
Knowledge management	5	1,871	0.07	0.03	0.11	3.43	0.00	51.00	3%
Learning	12	2,149	0.26	0.20	0.31	8.48	0.00	23.39	52%
R&D	4	1,799	0.19	0.14	0.24	7.42	0.00	4.52	11%
Organizational factor	13	2,615	0.316	0.263	0.367	11.09	0.00	22.90	47%
Market orientation	7	1,368	0.28	0.23	0.33	10.51	0.00	9.24	35%
Organisational Culture	6	1,247	0.35	0.29	0.40	11.47	0.00	10.405	51%
Consequences of innovation capability									
Performance	11	2,352	0.19	0.126	0.27	5.317	0.00	34.144	71%

Note: k: no of effect size; *r*: correlation coefficient; *p*<0.05

Table 1 summarizes the bivariate correlation for the antecedents and consequences of innovation capability. The correlations between innovation capability and its antecedents are positive and significant such as knowledge management (*r*=0.07, *p*<0.05); learning (*r*=0.26, *p*<0.05); R&D (*r*=0.19, *p*<0.00); market orientation (*r*=0.28, *p*<0.05); organizational culture (*r*=0.35, *p*<0.00). Considering the strength of the relationship with innovation capability, organisational culture is shown to have a strong impact on the firm’s innovation capability. Furthermore, the organisational factor is also shown

to have more impact on a firm’s innovation capability than a knowledge factor.

The test for heterogeneity using the I-squared instead of Q-value is identified to detect variances when it is present. However, the rule of thumb for heterogeneity proposed that with 25%, the heterogeneity is low; 50% is moderate and 75% is high (Crombie & Davies, 2009). Although, if heterogeneity were absent, then the analysis would have to employ fixed-effect modelling in which the effect size is same across studies but, there is variation between studies. Hence, examining the study characteristics as moderators may account for some or all of the heterogeneity (Crombie & Davies, 2009; Del Re, 2011).

The table 1 further shows that the relationship between innovation capability and performance is positive and significant ($r=0.19, p<0.05$) however, the I-squared level is high ($I^2=71%$) which explains that the variation level is high between studies. This also explain that there are various factors that contributes to the variance in the relationship between innovation capability and performance.

Table 2: Variance in the Innovation Capability-Performance Relationship

Variable	Hypothesis	Model 1	Model 2	Model 3
		<i>r</i> (p-value)	B (P-value)	B (P-value)
Innovation capability-performance	H ₁	0.19 (0.00)		
Sample Characteristics				
Manufacturing versus service	H ₂		0.077 (0.45)	
Large firms versus small firms	H ₃			0.028(0.73)
Q-value		34.14	22.70	34.12
Degree of freedom		10	7	9

Note: P<0.05, B: beta in the regression coefficient

Hypothesis 1: There is no significant relationship between innovation capability and performance

The analysis focused on the average mean correlation coefficient and p-value to explain the magnitude and significance of the relationship. The result shows there is a correlation, but with a small effect ($r=0.19$). This shows that the performance of a firm would increase by 1.9% as the firm improves its innovation capability.

Further in the analysis, the combined result between innovation capability and performance for the confidence interval (CI= 0.12 - 0.27) is positive and favours performance. This also explains the positive effect between innovation capability and performance.

Hypothesis 2: Firm type (manufacturing versus service) does not moderate the relationship between innovation capability and performance.

The result shows that firm type slightly moderate the relationship between innovation capability and performance. Following the work of Rosenbush, Brinckman and Bausch (2011), this study used service firm as the reference category in order to compare manufacturing firms to service firms and the coefficient refers to the differences in effect size compared to service firm. The coefficient (B= 0.077, $p= 0.45$), explain that manufacturing firm has a higher impact to moderate the relationship between innovation capability and performance than service firm.

Although, the coefficient is positive but with a high P-value ($p>0.05$), however, Hak, Rhee and Suurmond (2016) note that lack of significance level does not mean the moderating effect is absent.

The result shows that effect size is weak. Nevertheless, there is an observable relationship between the moderator and innovation capability-performance relationship. That is, the manufacturing firm does have a slight influence on the innovation capability-performance relationship than service firm.

Hypothesis 3: Firm size (large versus small) does not moderate the relationship between innovation capability and performance.

The result from hypothesis 3 explains that firms size slightly moderates the relationship between innovation capability and performance. Also, large firm ($B = 0.028$) is positively correlated and have a higher influence to moderate the relationship between innovation capability and performance than small firms.

Although, the coefficient is positively correlated but, with a high P-value ($p > 0.05$) however, Hak et al. (2016) note that lack of significance level does not mean the moderating effect is absent. The result shows that the effect size is weak. Nevertheless, there is an observable relationship between the moderator and innovation capability-performance relationship. That is, the large firm does have a slight influence on the innovation capability-performance relationship than small firm.

Summary and Discussion of Findings

The meta-analysis reported a bivariate relationship that revealed the determinants of innovation capability to be significant. The organisational factor portrayed a significant impact on innovation capability compared to the knowledge factor when considering the strength of the relationship. Also, organisational culture have the highest impact on innovation capability compared to other antecedents of innovation capability. Reviews on organisational culture relate it as a fundamental characteristic of the organization (Martins and Terblache, 2003), which has the ability to impact innovation activities of the organization (Uzkurt et al., 2013). This depicts the benefits of embracing the organisational culture to improve an organization's innovation activities.

An overall review of innovation capability and performance relationship showed a significant relationship but the magnitude of their relationship was low. Tornatzky and Klein, (1982) revealed that some organisation might experience minor or slight change while some major or radical changes. Thus, a small impact of innovation capability can enable the organization to improve its capability to innovate leading to superior performance.

An examination of the moderators explains that firm type has a minimal impact on the innovation capability-performance relationship especially manufacturing firms. Damanpour, (1991) and Hogan et al. (2011) note that different types of organisation deploy resources in an uneven manner based on their nature of activities thus, manufacturing firm is identified to deploy their resources and capabilities more than service firms. Furthermore, firm size also has a minimal impact on the innovation capability-performance relationship especially large firms compared to small firms. This finding is consistent with the work of Anderson and Eshima (2013) in which firm size correlates with the available resources in the organization, thus, large firms tend to have the capability to innovate and improve their performance.

Conclusion and Recommendation

This study assessed organisational culture as the most significant antecedent of innovation capability. Meanwhile, empirical examination of the possible moderators of innovation capability-performance relationship revealed that irrespective of the size and type of a firm, the role of innovation capability in improving the firm performance cannot be over-emphasized.

This study, therefore, recommends that organizations should identify the available resources within the organization in order to actively engage in innovative activities to improve the performance of the organization. Also, organization culture should be majorly considered when employing the available resources and capability in the firm or departments in the organization.

The overall impact of innovation capability-performance relationship considered the influence of firm size and type, which can moderate the innovation capability-performance relationship. Thus, organizations should not be limited by its type and size, but innovatively utilize the available resources and capabilities within the organization to improve the performance of the organization.

Limitation and suggestion for further studies

The relationship between innovation capability and performance was studied, but not all the studies in the analysis were included because some effect size was not reported in the form that could be easily converted. The moderators identified in this study was limited to firm size and firm type. Other possible moderators such as the area of research (country), age of the firm, market structure as well as micro-environmental factors. Thus, further studies should consider other possible moderators

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References

- Acs, Z. J., & Audretsch, D. B. (1987). Innovation, market structure, and firm size. *The review of Economics and Statistics*, 567-574.
- Adler, P. S. & Shenbar, A. (1990) Adapting your technological base: The organizational challenge. *Sloan Management Review*, 25, 25-37.
- Anderson, B. S., & Eshima, Y. (2013). The influence of firm age and intangible resources on the relationship between entrepreneurial orientation and firm growth among Japanese SMEs. *Journal of Business Venturing*, 28(3), 413-429. doi:10.1016/j.jbusvent.2011.10.001
- Assink, M. (2006). Inhibitors of disruptive innovation capability: a conceptual model. *European Journal of Innovation Management*, 9(2), 215-233.
- Baker, W. E., & Sinkula, J. M. (1999). The synergistic effect of market orientation and learning orientation on organizational performance. *Journal of the academy of marketing science*, 27(4), 411-427.
- Barney, J. B. (2001). Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view. *Journal of management*, 27(6), 643-650.
- Brown, S. P., & Peterson, R. A. (1993). Antecedents and consequences of salesperson job satisfaction: Meta-analysis and assessment of causal effects. *Journal of marketing research*, 30(1), 63.
- Burgelman, R., Maidique, M., & Wheelwright, S. (2004). *Strategic management of technology and innovation*: Times Mirror Higher Education Group.
- Çakar, N. D., & Ertürk, A. (2010). Comparing innovation capability of small and medium-sized

- enterprises: examining the effects of organizational culture and empowerment. *Journal of Small Business Management*, 48(3), 325-359.
- Calantone, R. J., Cavusgil, S. T., & Zhao, Y. (2002). Learning orientation, firm innovation capability, and firm performance. *Industrial marketing management*, 31(6), 515-524.
- Cameron, K.S. and Quinn, R.E., 1999. *Diagnosing and Changing Organizational Culture. Based on the Competing Values Framework*, Addison-Wesley, Reading, MA.
- Cavusgil, S., Calantone, R. J., & Zhao, Y. (2003). Tacit knowledge transfer and firm innovation capability. *Journal of business & industrial marketing*, 18(1), 6-21. <http://dx.doi.org/10.1108/01437720710755272>.
- Che-Ha, N., Mavondo, F. T., & Mohd-Said, S. (2014). Performance or learning goal orientation: Implications for business performance. *Journal of Business Research*, 67(1), 2811-2820. <http://dx.doi.org/10.1016/j.jbusres.2012.08.002>
- Chen, C. J., & Huang, J. W. (2009). Strategic human resource practices and innovation performance—The mediating role of knowledge management capacity. *Journal of business research*, 62(1), 104-114. doi:10.1016/j.jbusres.2007.11.016
- Cohen, W. M., Levin, R. C., & Mowery, D. C. (1987). Firm size and R&D intensity: A re-examination.
- Collis, D. J. (1994). Research note: how valuable are organizational capabilities?. *Strategic management journal*, 15(S1), 143-152.
- Crombie, I. K., & Davies, H. T. (2009). What is meta-analysis. *What is*, 1-8.
- Czarnitzki, D., & Kraft, K. (2006). R&D and firm performance in a transition economy. *Kyklos*, 59(4), 481-496.
- Dadfar, H., Dahlgaard, J. J., Brege, S., & Alamirhoor, A. (2013). Linkage between organisational innovation capability, product platform development and performance: The case of pharmaceutical small and medium enterprises in Iran. *Total Quality Management & Business Excellence*, 24(7-8), 819-834.
- Dalal, R. S. (2005). A meta-analysis of the relationship between organizational citizenship behavior and counterproductive work behavior. *Journal of applied psychology*, 90(6), 1241.
- Dalvand, V., Moshabaki, A., & Karampour 2015, A. The impact of innovation capabilities on export performance of firms. *Applied mathematics in engineering, management and technology*, 3(2), 295-308
- Damanpour, F. (1991). Organizational innovation: A meta-analysis of effects of determinants and moderators. *Academy of management journal*, 34(3), 555-590.
- Damanpour, F., & Evan, W. M. (1984). Organizational innovation and performance: the problem of "organizational lag". *Administrative science quarterly*, 392-409.
- Darroch, J. (2005). Knowledge management, innovation and firm performance. *Journal of knowledge management*, 9(3), 101-115. DOI 10.1108/13673270510602809
- DeCarolis, D. M., & Deeds, D. L. (1999). The impact of stocks and flows of organizational knowledge on firm performance: An empirical investigation of the biotechnology industry. *Strategic management journal*, 953-968. doi:10.1016/j.jbusvent.2005.06.001
- DeCoster, J. (2004). Meta-analysis notes.
- Del Re, A. C. (2015). A practical tutorial on conducting meta-analysis in R. *The Quantitative Methods for Psychology*, 11(1), 37-50.
- Field, A. P., & Gillett, R. (2010). How to do a meta-analysis. *British Journal of Mathematical and Statistical Psychology*, 63(3), 665-694.
- Forsman, H. (2011). Innovation capacity and innovation development in small enterprises. A comparison between the manufacturing and service sectors. *Research Policy*, 40(5), 739-750. doi:10.1016/j.respol.2011.02.003
- Fosfuri, A., & Tribó, J. A. (2008). Exploring the antecedents of potential absorptive capacity and its impact on innovation performance. *Omega*, 36(2), 173-187. doi:10.1016/j.omega.2006.06.012
- Giniuniene, J., & Jurksiene, L. (2015). Dynamic capabilities, innovation and organizational learning: Interrelations and impact on firm performance. *Procedia-Social and Behavioral Sciences*, 213, 985-991. doi: 10.1016/j.sbspro.2015.11.515

- Glass, G. V. (1976). Primary, secondary, and meta-analysis of research. *Educational researcher*, 5(10), 3-8.
- Grant, R. M. (1999). The resource-based theory of competitive advantage: implications for strategy formulation. In *Knowledge and strategy* (pp. 3-23).
- Guan, J., & Ma, N. (2003). Innovative capability and export performance of Chinese firms. *Technovation*, 23(9), 737-747. doi:10.1016/S0166-4972(02)00013-5
- Hak, T., Van Rhee, H. J., & Suurmond, R., (2015). User manual for meta-essentials: Workbooks for meta-analyses (Version 1.0).
- Hofstede, G., 1983. The Cultural Relativity of Organisational Practices and Theories. *Journal of International Business Studies*, XIV (2), 75-90.
- Hogan, S. J., Soutar, G. N., McColl-Kennedy, J. R., and Sweeney, J. C., 2011. Reconceptualising professional service firm innovation capability: Scale development. *Industrial Marketing Management*, 40 (8), 1264-1273.
- Hunter, J. E., & Schmidt, F. L. (2004). *Methods of meta-analysis: Correcting error and bias in research findings*. Sage.
- Jaskyte, K., & Dressler, W. W. (2005). Organizational culture and innovation in nonprofit human service organizations. *Administration in social work*, 29(2), 23-41. 10.1300/J147v29n02_03
- Jaworski, B. J., & Kohli, A. K. (1996). Market orientation: review, refinement, and roadmap. *Journal of Market-Focused Management*, 1(2), 119-135.
- King, W. R., & He, J. (2005). Understanding the role and methods of meta-analysis in IS research. *Communications of the Association for Information Systems*, 16(1), 32.
- Kogut, B., & Zander, U., (1992). Knowledge of firm, combinative capability and the replication of technology. *Organization Science*, 3, 383-397.
- Krishnan, H. A., Tadepalli, R., & Park, D. (2009). R&D intensity, marketing intensity, and organizational performance. *Journal of Managerial Issues*, 232-244.
- Lee, T. S., & Tsai, H. J. (2005). The effects of business operation mode on market orientation, learning orientation and innovativeness. *Industrial Management & Data Systems*, 105(3), 325-348. DOI 10.1108/02635570510590147
- Leonard-Barton, D. (1992). Core capabilities and core rigidities: A paradox in managing new product development. *Strategic management journal*, 13(1), 111-125.
- Liao, S. H., & Wu, C. C. (2010). System perspective of knowledge management, organizational learning, and organizational innovation. *Expert systems with Applications*, 37(2), 1096-1103. doi:10.1016/j.eswa.2009.06.109
- Liao, S. H., Chang, W. J., Hu, D. C., & Yueh, Y. L. (2012). Relationships among organizational culture, knowledge acquisition, organizational learning, and organizational innovation in Taiwan's banking and insurance industries. *The International Journal of Human Resource Management*, 23(1), 52-70. <http://dx.doi.org/10.1080/09585192.2011.599947>
- Lin, H. F. (2007). Knowledge sharing and firm innovation capability: an empirical study. *International Journal of manpower*, 28(3/4), 315-332. DOI 10.1108/01437720710755272.
- Liu, X., Vredenburg, H., & Steel, P. (2014). A meta-analysis of factors leading to management control in international joint ventures. *Journal of International Management*, 20(2), 219-236.
- Martinez-Roman, J. A., Gamero, J., & 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*, 31(9), 459-475. doi:10.1016/j.technovation.2011.05.005
- Martins, E. C., and Terblanche, F., 2003. Building organisational culture that stimulates creativity and innovation. *European Journal of Innovation Management*, 6 (1), 64-74.
- Maurer, I., Bartsch, V., & Ebers, M. (2011). The value of intra-organizational social capital: How it fosters knowledge transfer, innovation performance, and growth. *Organization Studies*, 32(2), 157-185.
- Mavondo, F. T., Chimhanzi, J., & Stewart, J. (2005). Learning orientation and market orientation: Relationship with innovation, human resource practices and performance. *European journal of marketing*, 39(11/12), 1235-1263. DOI 10.1108/03090560510623244

- Mir, M., Casadesús, M., & Petnji, L. H. (2016). The impact of standardized innovation management systems on innovation capability and business performance: An empirical study. *Journal of Engineering and Technology Management*, 41, 26-44. <http://dx.doi.org/10.1016/j.jengtecman.2016.06.002>
- Morgan, R. E., & Berthon, P. (2008). Market orientation, generative learning, innovation strategy and business performance inter-relationships in bioscience firms. *Journal of Management Studies*, 45(8), 1329-1353. doi: 10.1111/j.1467-6486.2008.00778.x
- Nada, N., & Ali, Z., 2015. Service Value Creation Capability Model to Assess the Service Innovation Capability in SMEs. *Procedia CIRP*, 30, 390-395.
- Neely, A. (Ed.). (2002). *Business performance measurement: theory and practice*. Cambridge University Press.
- Noruzi, A., Dalfard, V. M., Azhdari, B., Nazari-Shirkouhi, S., & Rezazadeh, A. (2013). Relations between transformational leadership, organizational learning, knowledge management, organizational innovation, and organizational performance: an empirical investigation of manufacturing firms. *The International Journal of Advanced Manufacturing Technology*, 64(5-8), 1073-1085. DOI 10.1007/s00170-012-4038-y
- Rajapathirana, R. J., & Hui, Y. (2017). Relationship between innovation capability, innovation type, and firm performance. *Journal of Innovation & Knowledge*. <http://dx.doi.org/10.1016/j.jik.2017.06.002>
- Ramanathan, R., Ramanathan, U., & Bentley, Y. (2018). The debate on flexibility of environmental regulations, innovation capabilities and financial performance—A novel use of DEA. *Omega*, 75, 131-138. <http://dx.doi.org/10.1016/j.omega.2017.02.006>
- Raymond, L., Bergeron, F., & Croteau, A. M. (2013). Innovation capability and performance of manufacturing SMEs: The paradoxical effect of IT integration. *Journal of Organizational Computing and Electronic Commerce*, 23(3), 249-272.
- Rosenbusch, N., Brinckmann, J., & Bausch, A. (2011). Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs. *Journal of business Venturing*, 26(4), 441-457.
- Rosenthal, R., & DiMatteo, M. R. (2001). Meta-analysis: Recent developments in quantitative methods for literature reviews. *Annual review of psychology*, 52(1), 59-82.
- Sánchez, A. A., Marín, G. S., & Morales, A. M. (2015). The mediating effect of strategic human resource practices on knowledge management and firm performance. *Revista Europea de Dirección y Economía de la Empresa*, 24(3), 138-148. <http://dx.doi.org/10.1016/j.redee.2015.03.003>
- Santos, J. B., & Brito, L. A. L. (2012). Toward a subjective measurement model for firm performance. *BAR-Brazilian Administration Review*, 9(SPE), 95-117.
- Saunila, M. (2016). Performance measurement approach for innovation capability in SMEs. *International Journal of Productivity and Performance Management*, 65(2), 162-176.
- 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. DOI 10.1108/IJPPM-04-2013-0065
- Saunila, M., & Ukko, J. (2014). Intangible aspects of innovation capability in SMEs: Impacts of size and industry. *Journal of Engineering and Technology Management*, 33, 32-46. <http://dx.doi.org/10.1016/j.jengtecman.2014.02.002> 0923-4748/ 2014
- Sok, P., & O'Cass, A. (2011). Achieving superior innovation-based performance outcomes in SMEs through innovation resource—capability complementarity. *Industrial Marketing Management*, 40(8), 1285-1293. doi:10.1016/j.indmarman.2011.10.007
- Thornhill, S. (2006). Knowledge, innovation and firm performance in high-and low-technology regimes. *Journal of business venturing*, 21(5), 687-703. doi:10.1016/j.jbusvent.2005.06.001
- Tornatzky, L. G., & Klein, K. J. (1982). Innovation characteristics and innovation adoption-implementation: A meta-analysis of findings. *IEEE Transactions on engineering management*, (1), 28-45.

Uzkurt, C., Kumar, R., Semih Kimzan, H., & Eminoğlu, G. (2013). Role of innovation in the relationship between organizational culture and firm performance: A study of the banking sector in Turkey. *European Journal of innovation management*, 16(1), 92-117. DOI 10.1108/14601061311292878

Venkatraman, N., & Ramanujam, V. (1986). Measurement of business performance in strategy research: A comparison of approaches. *Academy of management review*, 11(4), 801-814.

Wagner, J. (1995). Exports, firm size, and firm dynamics. *Small Business Economics*, 7(1), 29-39.

Wang, X., & Dass, M. (2017). Building innovation capability: The role of top management innovativeness and relative-exploration orientation. *Journal of Business Research*, 76, 127-135.

Wang, Z., & Wang, N. (2012). Knowledge sharing, innovation and firm performance. *Expert systems with applications*, 39(10), 8899-8908. doi:10.1016/j.eswa.2012.02.017

Wang, Z., Wang, N., & Liang, H. (2014). Knowledge sharing, intellectual capital and firm performance. *Management decision*, 52(2), 230-258. DOI 10.1108/MD-02-2013-0064

Yaghoubi, M., Teymourzadeh, E., Bahadori, M., & Ghardashi, F. (2017). Conceptual Model of Innovation Capability in Industrial and Academic Research Centers: A Systematic Review. *Iranian Journal of Management Studies*, 10(3), 609-640. DOI: 10.22059/ijms.2017.238379.672756

Yang, C., Zhang, Q., & Ding, S. (2015). An evaluation method for innovation capability based on uncertain linguistic variables. *Applied Mathematics and Computation*, 256, 160-174. <http://dx.doi.org/10.1016/j.amc.2014.12.154>

Yasuda, T. (2005). Firm growth, size, age and behaviour in Japanese manufacturing. *Small Business Economics*, 24(1), 1-15.

Zulfikar, R., Kartini, D., Suryana, Y., & Mulyana, A. (2017). The Impact of Capability Innovation To Marketing Performance Through Value Creation At The Center Of Small And Medium Knitting Industry In Bandung. *International Journal Of Scientific And Research Publication*. 7(5), 530-541.

APPENDIX 1

Overview of Innovation Capability

Authors (Year)	Journal		Sample size	Innovation Capability classification	Effect size	Empirical Country	Empirical setting
Calantone, Cavusgil & Zhao (2002)	Industrial Management	Marketing	187	Learning	0.37	USA	Manufacturing service
Che-Ha, Mavondo & Mohd-Said (2014)	Journal of Research	Business	223	Learning Market orientation Performance	0.20 0.27 0.370	Malaysia	Manufacturing service
Chen & Huang (2009)	Journal of Research	Business	146	Knowledge management performance	0,62 0.03	China	Service
Dadfar et al (2013)	Total management and Business Excellence	Quality and	168	Learning	0.23	Iran	Manufacturing
Dalvand, Moshabaki & Karampour (2015)	Applied Mathematics in Engineering Management and Technology		340	Organizational culture Learning Research and development Performance	0.333 0.021 0.160 0.254	Iran	Manufacturing
Donate & Guadamillas (2010)	Knowledge and Process Management		111	Organizational culture	0.45	Spain	Manufacturing
Guan & Ma (2003)	Technovation		213	Learning Research and development	0.253 0.207	Beijing	Manufacturing

Hogan & Coote (2014)	Journal of Business Research	100	Organizational culture	0.39	Australia	Service
Hurley & Hult (1998)	Journal of Marketing	56	Organizational culture	0.48	U.S.A	Service
Keshin (2006)	European Journal of Innovation Management	157	Learning Market Orientation	0.213 0.34	Turkey	SMEs
Krishnan, Tadepaali & Park (2009)	Journal of Management Issues	201	Research and development	0.11	USA	Service
Liao & Wu (2010)	Expert Systems with Applications	327	Knowledge management learning	0.52 0.51	Taiwan	Service
Liao, Fei & Liu (2008)	Techovation	485	Knowledge management	0.075	Taiwan	Manufacturing service
Maurer, Bartch & Ebers (2011)	Organization Studies	218	Knowledge management	0.52	Germany	Manufacturing
Montes, Moreno & Morales (2005)	Technovation	202	Learning Organizational culture	0.26 0.48	Spain	Manufacturing
Noruziy et al (2013)	International Journal of Advance Manufacturing Technology	280	Performance	0.330	Iran	Manufacturing
Salim & Sulaimon (2011)	International Journal of Business and Management	102	Learning	0.22	Malaysia	SMEs
Salyova et al (2015)	Procedia Economics and Finance	62	Market orientation	0.303	Slovak	Manufacturing
Saunila, Pekkola & Ukko (2014)	International Journal of Productivity and performance Management	311	Performance	0.041	311	SMEs
Shazad et al (2017)	Technology in Society	215	Organizational culture	0.57	Pakistan	Service
Thornhill (2006)	Journal of Business Venturing	845	Research and development Knowledge management	0.07 0.190	Canada	Manufacturing
Uzkurt, Kumar, Kimzan & Eminoglu (2013)	European Journal of Innovation Management	154	Organizational culture	0.56	Turkey	Service
Wang and Wang (2012)	Expert Systems with Applications	209	Knowledge management	0.087	China	Service
Yam, Tang & Lau (2011)	Research Policy	200	Performance Research and development	0.225 0.168	Hong Kong	Manufacturing
Zhou & Li (2012)	Strategic Management Journal	177	Knowledge management	0.120	China	Service

Overview of Innovation Capability
Source: Own Elaboration

APPENDIX 2

Antecedents and Consequences of Innovation Capability

Antecedents	Items	Indicators	References
Knowledge factor	Knowledge management	Knowledge sharing, knowledge transfer, knowledge acquisition, knowledge dissemination	Chen & Huang (2009), Darroch (2005), Liao, Fei & Liu (2008), Lin (2007), Maurer, bartsch & Ebers (2011); Thornhill (2006), Zhou & Li (2012)

Learning orientation	Commitment to learning. Shared vision, open mindedness, intra-organizational, internal learning, external learning	Calantone, Cavusgil & Zhao (2002), Che-Ha, Mavondo & Mohd-Said (2014), Dadfar et al (2013), Keshin (2006), Liao & Wu (2010), Montes, Moreno & Morales (2005), Salim & Sulaimon (2011)
R&D management	R&D intensity	Dalvand, Moshabaki & Karampour (2015), Guan & Ma (2003), Krishnan, Tadepaali & Park (2009), Saunila, Pekkola & Ukko (2014), Thornhill (2006), Yam, Tang & Lau (2011)
Organizational factor	Culture	Consistency, effectiveness, team orientation, goal orientation, people empowerment
	Market orientation	Customer orientation, Competitor orientation, Interfunctional coordination
Dalvand, Moshabaki & Karampour (2015), Donate & Guadamillas (2010), Hogan & Coote (2014), Hurley & Hult (1998), Jaskytes & Dressler (2005), Montes, Moreno & Morales (2005), Shazad et al (2017)		
Altuntas, Semercioz & Eregez (2013), Che-Ha, Mavondo & Mohd-Said (2014), Grawe, (2009); Keshin (2006), Mavondo, (2008); Morgan (2008); Salyova et al (2015)		

Table1: Antecedents of Innovation Capability
Source: Own Elaboration