



The impact of entrepreneurship on managerial innovation capacity: The moderating effects of policy finance and management support

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Purpose: Entrepreneurship can offer a competitive advantage to an enterprise through risky decisions that pay off in the development of innovative products, services and markets in a difficult managerial environment and by moving proactively to dominate a competitive market. This study aims to examine the relationship between entrepreneurship and managerial innovation capacity by considering subfactors, such as innovativeness, proactiveness and risk-taking, as well as to explore the relationship between managerial innovation capacity and management performance. The study determines the extent to which policy finance and management support for small and medium-sized enterprises (SMEs) play the role of moderating variables.

Design/methodology/approach: Data collection was carried out in 820 SMEs. To verify the hypotheses, Covariance Structure Analysis was conducted using EQS6b.

Findings/results: The findings indicate that entrepreneurship has a significant influence on strategic planning, research and development, and technology commercialisation. This study found that managerial innovation capacities have positive effects on management performance. In addition, this study confirmed that when entrepreneurship affects managerial innovation activities, policy financial support and management support serve as moderators.

Practical implications: Small and medium-sized enterprises should enhance their innovation capacity and expand innovative entrepreneurship and policy finance to achieve competitiveness, survive and show continuous development and growth in a changing environment.

Originality/value: The study provides SMEs with information they can use to increase their awareness of internal managerial innovation activities, which are the original sources of competitive advantage, and help promote research and development (R&D) and organizational management for continuous reinforcement of innovation capacity. The study provides SMEs with information they can use to increase their awareness of internal managerial innovation activities, which are the original sources of competitive advantage, and help promote R&D and organizational management for continuous reinforcement of innovation capacity.

Keywords: entrepreneurship; managerial innovation capacity; policy financial support; management support; management performance.

Introduction

In the context of a corporate management environment driven by the rapid development of information and communication technology (ICT), fierce competition, new regulatory regimes, and political and economic uncertainty, business enterprises increasingly feel the pressure to expand their capacity to undertake innovation in technology, processes, services, product design and quality. An enterprise's innovation capacity enables it to successfully implement and apply new ideas to products and processes (Burns & Stalker, 1961), and to explore new opportunities or devise new solutions to marketing problems (Dess & Lumpkin, 2005). Because innovation capacity strengthens competitiveness (Guan, Yam, Mok, & Ma, 2006) and innovative products resulting from high innovation capacity are more attractive to customers, expanding and strengthening the capacity to innovate can help secure a competitive advantage (Oke, Burke, & Myers, 2007).

Entrepreneurship requires creative or innovative minds that take risks to decisively challenge and create new markets. Many studies find that entrepreneurship increases firm growth, profitability, competitive advantage and ultimately survival (Zahra, Covin, & Slevin, 1995; Zahra, 1996). Therefore, entrepreneurship can offer competitive advantage to an enterprise through risky decisions that pay off in the development of innovative products, services and markets in a difficult managerial environment and by moving proactively to dominate a competitive market (Covin & Slevin, 1991). In such a rapidly changing environment, there is a broad consensus that entrepreneurship in small

and medium-sized enterprises (SMEs) is an essential factor in enhancing competitiveness and securing economic growth. Innovative entrepreneurship and managerial innovation capacity have lately been recognised as directly linked to the survival of enterprises and even nations.

This study aims to examine the relationship between entrepreneurship and managerial innovation capacity by considering subfactors, such as innovativeness, proactiveness and risk-taking, as well as to explore the relationship between managerial innovation capacity and management performance. More specifically, the study was designed to determine the extent to which policy finance and management support (which includes consulting and marketing support) for SMEs play the role of moderating variables in relation to the effect of managerial innovation capacity through entrepreneurship on management performance. Because so much research on this role has focussed on large enterprises, it is necessary to identify subfactors of entrepreneurship and managerial innovation capacity in SMEs.

Literature and theoretical background

Entrepreneurship

Entrepreneurship allows firms to explore, respond to and effectively use changes in the managerial environment, playing a catalytic role by inducing innovation that either introduces new products and services or adds value to the existing products and services (Schumpeter, 1934). In developed nations, entrepreneurship is considered the most important force driving regional and economic development and social change. According to Drucker (1985), entrepreneurs discover new aspects in existing products and services, cause revolutions, create new values and explore changes. Schumpeter (1934) regarded an entrepreneur as an innovator who executes a change in a market through new combinations. Such entrepreneurial attributes comprise entrepreneurship. Miller (1983) identified three major components of entrepreneurship: innovativeness, proactiveness, and risk-taking (Covin & Wales, 2018; Frishammar & Horte, 2007; Van Zyl & Mathur-Helm, 2007).

Entrepreneurship not only brings vital energy to an organisation and mitigates the effects of bureaucratic formalism but also reinforces corporate competitiveness in the global environment. Some argue, however, that this area of scholarship suffers from a lack of theoretical agreement on the various terms related to entrepreneurship (McFadzean, O'Loughlin, & Shaw, 2005). It is widely acknowledged that corporate entrepreneurship is correlated with corporate performance (Nihat, 2006; Vozikis, Bruton, Prasad, & Merikas, 1999; Yang, Li-Hua, Zhang, & Wang, 2007; Zahra & Garvis, 2000). For instance, Yang et al. (2007) reported that each of the core dimensions of entrepreneurship has a differentiated impact on corporate performance. Nihat (2006) discovered that a firm's personnel management method mediates the relationship between entrepreneurship and performance. Zahra and Garvis (2000), who discussed corporate

entrepreneurship and performance in various countries, and Vozikis et al. (1999), who reviewed the relationship between entrepreneurship and value creation, presented similar views.

Researchers increasingly agree that entrepreneurship enhances organisational performance (Rauch, Wiklund, Lumpkin, & Frese, 2009; Zahra, Jennings, & Kuratko, 1999). Entrepreneurial orientation is a core concept in the literature on entrepreneurship (Bock & George, 2011). Some scholars note that the three main dimensions of entrepreneurship, namely, innovation, proactiveness and risk-taking, combine to form the basic strategic entrepreneurial orientation (Covin & Slevin, 1989; Covin & Wales, 2018). This construct may have limited utility because entrepreneurial orientation may simply be a predisposition to engage in entrepreneurial behaviour (Dess & Lumpkin, 2005; Miller, 2011; Short, Broberg, Cogliser, & Brigham, 2009).

Managerial innovation capacity

There is no consensus definition of innovation capacity. According to Schumpeter (1934), innovation involves a series of activities that utilise new ideas to make and provide saleable products and services.

Innovation capacity is, then, the ability of an enterprise to successfully implement and apply new ideas to products, services and processes (Burgelman, Christensen, & Wheelwright, 2009; Burns & Stalker, 1961; Dess & Lumpkin, 2005; Guan & Ma, 2003). Because innovation activities begin with internally examining an organisation to determine its core capacity, differences in innovation activities between enterprises are related to specific enterprise resources. Innovation capacity reinforces competitiveness (Guan et al., 2006). Especially for venture enterprises, the capacity to develop new technologies and apply them to products and services more quickly than competitors is extremely important, and a high level of innovation capacity affects technological innovation performance.

Other recent studies define innovation capacity from a comprehensive perspective that includes research and development (R&D) and the commercialisation of technology (Guan et al., 2006; Wang, Lu, & Chen, 2008; Yam, Pun, & Tang, 2004). Although existing studies consider only direct technological development as a factor that affects technology innovation in relation to innovation capacity, Wang et al. (2008) considered quantitative and emotional dimensions of the innovative decision-making capacity to include indirect management activities that support and facilitate innovation of direct technologies. Such innovation capacity affects external collaboration activities. To utilise external collaboration (Albert et al., 2000) as a means of compensating for missing resources, an enterprise must have the internal ability to absorb and use external resources (Cohen & Levinthal, 1990; Lipparini & Sobrero, 1994; Tsai, 1991).

Enterprises can perform innovation activities to enhance innovation performance. According to Cohen and Levinthal (1990), R&D plays a double-sided role of 'innovation' and 'learning'.

Enterprises enhance innovation performance through developing new technology and obtaining patent registrations from R&D, and they gain the ability to absorb and use external knowledge. As such, R&D can contribute to direct creation of innovation performance and enhancement of the ability to absorb knowledge.

Innovation capacity also involves the ability to respond to market demand, and enterprises can form technological affiliations with external agencies to gain technologies and knowledge necessary for innovation.

Finally, innovation performance can be enhanced by the ability to utilise support from government policies and policy agencies. In a study that examined the relationship between the capacity of manufacturing enterprises to use government support policies and innovation performance, the ability of an enterprise to utilise external support was found to have a positive effect on the commercialisation of technologies (Lee & Limb, 2012). This result suggests a positive effect of the ability to use government support policies on innovation performance (Guan et al., 2006; Wang et al., 2008; Yam et al., 2004). This study defines managerial innovation capacity as a function of strategic planning, R&D and commercialisation activities based on previous studies.

Research hypotheses

Many studies on entrepreneurship have examined the relationship between entrepreneurship and management performance. Smart and Conant (1994) suggested that entrepreneurship and performance have a significant relationship, and Zahra et al. (1995) demonstrated a significant and positive relationship between entrepreneurship and organisation performance. Performance related to entrepreneurship can be examined from individual, organisational and social perspectives – wealth creation, business creation, innovation, change management, job creation and growth. Entrepreneurial attitudes function as subfactors closely related to corporate strategy, business performance, financing and profitability (Covin & Selvin, 1991; Zahra, 1996). In many studies conducted on SMEs and venture enterprises, entrepreneurship was found to be closely related to start-up intention, financial performance and increased sales. Studies that approach entrepreneurship from various perspectives also interpret entrepreneurship as an important corporate resource.

Entrepreneurship must be recognised as a core resource of an enterprise to devise a successful strategy.

Some studies have emphasised that the significance of entrepreneurship lies in its potential to help the firm's top management delineate the purpose of the organisation, sustain the firm's vision and formulate a way to achieve advantages over competitors (Al-Mamun, Kumar, Ibrahim, & Bin Yusoff, 2017, p. 54). Entrepreneurship has consistently been found to be highly significant in firm performance and provide attributes to the organisation (Covin & Slevin, 1991; Miller, 1983).

When establishing a successful innovation strategy to accomplish a performance goal, SMEs that pursue innovation must inspect and evaluate their internal innovation capacity as an important intangible resource. Because the process of commercialising innovative ideas requires various structural functions, innovation- and market-oriented enterprises that include organisational management, production, resource allocation and marketing units are more likely to survive fierce competition and create marketability (Schoonhoven, Kathleen, & Lyman, 1990; White & Bruton, 2007). Entrepreneurship is an important motivating factor that facilitates innovation, creating or sustaining an innovative and competitive organisation for the purpose of generating profits and growing in risky and uncertain environments (Dollinger & Golden, 1992; Miller & Friesen, 1983).

Previous studies suggest that entrepreneurship has a decisive effect on management performance, but enterprises can achieve continuous growth only by converting entrepreneurship into innovation capacity to maintain and develop entrepreneurship in a changing managerial environment. Entrepreneurship not only has direct effects on management performance but also is linked to performance through innovation-related activities such as R&D, ICT and networking (Lee & Limb, 2012). The innovative management style of entrepreneurs was found to affect exploratory innovation activities and contribute to certification of new products (Lee & Limb, 2012). In addition, entrepreneurship likely affects managerial innovation capacity because it is reflected in management strategy. Accordingly, this study tests the following hypotheses:

- H1:** Entrepreneurship will positively influence the strategic planning capacity, a subfactor of managerial innovation activities.
- H2:** Entrepreneurship will positively influence the R&D capacity, a subfactor of managerial innovation activities.
- H3:** Entrepreneurship will positively influence the technology commercialisation capacity, a subfactor of managerial innovation activities.

As shown by existing studies on entrepreneurship and managerial innovation capacity, such variables affect various outcomes of management performance. Managerial innovation capacity is closely related to management performance and has positive effects (Drnovsek & Glas, 2002; Hmieleski & Baron, 2008; Westerberg, Singh, & Hackner, 1997). Previous studies argue that to survive in the competitive market, firms must sustain their performance through continuous innovation because innovation plays an important role in firm performance. Managerial innovation enhances firm performance because innovative activities make a firm more competitive and transforms a firm's internal capabilities (Alzuod & Kharabsheh, 2015; Rogers, 1998). Previous research found that managerial innovation in enterprises is closely related to the firm performance dimensions and the quality of services (profitability and market share as important non-financial firm performance indicators), and positively increases customer satisfaction

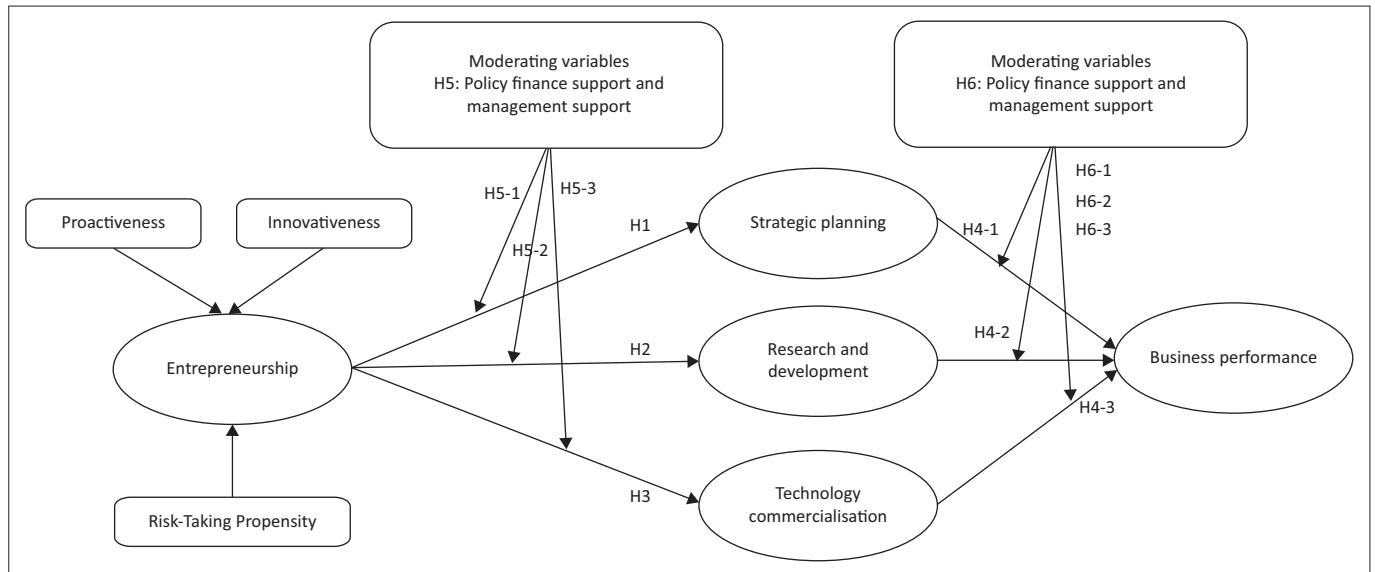


FIGURE 1: Conceptual framework.

and Return of Investment (ROI) (Daugherty, Chen, & Ferrin, 2011; Liao, Wang, Chuang, Shih, & Liu, 2010; Uz Kurt, Kumar, Kimzan, & Eminoglu, 2013). The following hypothesis reflects the prediction that managerial innovation activities will affect management performance.

H4: Managerial innovation factors (strategic planning capacity: H4-1; R&D capacity: H4-2; and technology commercialisation capacity: H4-3) will have positive effects on management performance.

Management performance is an outcome obtained from effective and efficient management of human and material resources. In general, management performance is defined as a result achieved by every business unit or function, work group or organisation member to accomplish an enterprise's goals. Management performance comprises the performance of all corporate units of accountability. All contemporary enterprises set various goals for a given period. Accomplishing goals can be considered part of management performance (Guan et al., 2006; Lee & Limb, 2012; Wang et al., 2008; Yam et al., 2004).

Performance can be generalised as a concept, which includes responsiveness, effectiveness, productivity, quality and timeliness. A performance standard is a scale that indicates the degree to which a management goal has been accomplished. A performance standard table also indicates the degree to which a management goal has been accomplished. Because defining and measuring performance is a fundamental step in performance improvement, performance measurement is extremely important (Lee & Limb, 2012; Wang et al., 2008).

Although policy finance and management support, classified as perceived possibility factors, are important issues related to business start-ups, new product development and finding new markets, most studies of these moderating variables are merely theoretical, as discussed earlier. There is a lack of empirical studies, and most studies simply examine causal relationships. In this study, perceived possibility factors are

divided into policy finance and management support (consulting and marketing support) provided by policy financing agencies. Policy finance includes loans, credit guarantees, investments and insurance. Studies link policy financing agencies and various government support policies closely to management performance in SMEs.

This study views policy finance and management support as potentially decisive factors in the success or failure of SMEs. Accordingly, the following hypotheses reflect the prediction that policy finance and management support for SMEs, which are perceived possibility factors, are related to managerial innovation activities and management performance.

H5: Policy finance and management support will have a moderating effect when entrepreneurship affects managerial innovation.

H6: Policy finance and management support will have a moderating effect when managerial innovation affects management performance.

The following model was created to accomplish the purpose of this study based on the theories and discussions presented (see Figure 1).

Research methodology

Procedures

Data were collected from SMEs in Korea. These companies were chosen because of their importance in promoting economic development in the country and were selected from the members of the K-BIZ (Korean Federation of Small and Medium-Sized Enterprises). A questionnaire was distributed to SMEs operating businesses with the help of policy financing agencies, including the Korea Credit Guarantee Fund, the Small and Medium Business Corporation and the Korea Development Bank. The author of this study provided sufficient explanation and asked the

chief executive officers (CEOs) of the enterprises to fill out the questionnaire as a self-administered survey. Members of K-Biz participated in this study. The researchers contacted the managers of the companies by email and phone and then explained the project and provided the survey. Prior to the survey, a preliminary survey was carried out in 50 SMEs. Data collection was carried out by online survey, in-person visits and postal mail. Willing participant companies were then directed to the online survey website. In addition, the researchers visited the companies on an agreed date and asked the participants to fill out the questionnaires as self-administered surveys. Respondents were given gift cards as compensation by the researchers. A total of 1025 responses were received, and 820 were selected for statistical analysis after excluding invalid responses, such as missing marks and cross marking. The response rate to this survey was over 80%. The survey questionnaire consisted of two parts, with demographic questions placed at the beginning. The second part of the survey included questions on entrepreneurship, managerial innovation capacity, management performance, and policy finance and management support, after excluding invalid responses. In addition, reliability and factor analyses were conducted.

Operational definitions of variables

Operational definitions of and measurement items for variables related to entrepreneurship, managerial innovation capacity, management performance, policy support and management support were arranged according to the attributes based on questionnaires used in previous studies. Measurement was performed using a 5-point Likert scale.

As noted, previous studies on entrepreneurship have separated entrepreneurship into three components – innovativeness, proactiveness and risk-taking (Covin & Slevin, 1989; Covin & Wales, 2018; Dimitratos, Voudouris, Plakoyiannaki, & Nakos, 2012; Lassen, Gertsen, & Riis, 2006; Miller, 1983). Firstly, innovativeness is the intent to plan and encourage ideas with the goal of developing new products, services or processes driven by consumer demand, and to implement new technologies through experimentation and a creative process. Proactiveness is the tendency to secure technological advantages over competitors by foreseeing future opportunities and taking prospective actions. Finally, risk-taking is the tendency to make decisions, take actions and invest resources in an uncertain managerial environment for potential future reward. Questions used in existing studies were rearranged to create 12 questions for this study (Covin & Wales, 2018; Hisrich & Brush, 1984; Miller, 1983; Zahra, 1996).

In this study, managerial innovation activities were divided into three subitems by identifying common items used in existing studies (Burgelman et al., 2009; Guan et al., 2006; Wang et al., 2008; White & Bruton, 2007; Yam et al., 2004). Managerial innovation capacity is the comprehensive ability to create value by developing, introducing and adopting new knowledge and processes to manufacture and supply

products and services. It comprises strategic planning capacity (six questions), R&D capacity (six questions) and technology commercialisation capacity (four questions).

The control variables utilised in this study include service year, corporate size and industry. Size was measured by the number of full-time employees, and industry was classified according to the Korean standard industrial classification into manufacturing, construction, distribution, services, and wholesale and retail trade.

In this study, policy finance and management support were selected as moderating variables. Questions used in existing studies were rearranged to comprise eight items to measure the moderating variables, including five questions on policy finance and three questions on management support (see Appendix 1).

There is great controversy over methods used to measure management performance, but in general both subjective and objective evaluations are used, either singly or in combination. Many researchers measure corporate performance using subjective evaluations (Narver & Slater, 1990). In this study, management performance was evaluated by dividing questions into those concerning financial performance and non-financial performance (Stuart & Abetti, 1987; Venkatraman & Ramanujam, 1986). The four measurement items included profitability, productivity, market share and brand awareness (Zahra et al., 1995).

Descriptive analysis

Exactly 820 subjects responded to this study questionnaire, and the study sample comprised CEOs of SMEs from Korea. As shown in Table 1, companies that had been in business for fewer than 5 years comprised 12.9% ($n = 106$) of the sample, while 18% ($n = 148$) had been founded 16–20 years prior to the study, with 30.9% ($n = 253$) being in existence for more

TABLE 1: Sample characteristics ($n = 820$).

Variable	Characteristic	Frequency	%
Sex	Male	734	89.5
	Female	86	10.5
Industry	Manufacture: Electronics	90	11
	Manufacture: Machinery	72	8.8
	Manufacture: Petroleum	54	6.6
	Manufacture: Clothes	111	13.5
	Construction	74	9
	Distribution	33	4
	Telecommunications	83	10.1
	Services	154	18.8
	Wholesale	109	13.3
	Others	40	4.9
Working years	Under 5	106	12.9
	6–15	321	39.1
	16–20	140	17.1
	Over 20	253	30.9
Size	Under 5 employees	239	29.1
	6–30 employees	441	63.7
	31–50 employees	89	10.9
	More than 50 employees	51	6.2

than 20 years. Manufacturing ranked first among business types at 39.9%, followed by specialised service businesses, telecommunications, retail businesses and construction companies. Companies with fewer than five employees comprised 29.1% ($n = 239$), while firms with more than 50 employees comprised 6.2% ($n = 51$).

TABLE 2: Results of factor analysis.

Construct	Items	FL	Eigenvalues	% of variance
Independent variables†				
Innovativeness	INN1	0.855	-	-
	INN2	0.810	-	-
	INN3	0.797	-	-
	INN4	0.785	-	-
Proactiveness	PRO1	0.832	-	-
	PRO2	0.796	-	-
	PRO3	0.777	-	-
	PRO4	0.768	-	-
Risk-taking propensity	RTP1	0.813	-	-
	RTP2	0.778	-	-
	RTP3	0.712	-	-
Factor 1	-	-	6.362	53.01
Factor 2	-	-	1.559	12.99
Factor 3	-	-	1.265	10.54
Moderating variables‡				
Policy financial support	PF1	0.865	-	-
	PF2	0.840	-	-
	PF3	0.752	-	-
	PE4	0.655	-	-
	PF5	0.645	-	-
Management support	MS1	0.838	-	-
	MS2	0.763	-	-
	MS3	0.725	-	-
Factor 1	-	-	4.914	61.43
Factor 2	-	-	1.118	13.97
Dependent variables§				
Strategic planning	SP1	0.802	-	-
	SP2	0.792	-	-
	SP3	0.788	-	-
	SP4	0.744	-	-
	SP5	0.705	-	-
	SP6	0.665	-	-
Research and development	RD1	0.884	-	-
	RD2	0.859	-	-
	RD3	0.836	-	-
	RD4	0.814	-	-
	RD5	0.800	-	-
	RD6	0.653	-	-
Technology commercialisation	TC1	0.773	-	-
	TC1	0.736	-	-
	TC1	0.731	-	-
Management performance	MP1	0.821	-	-
	MP2	0.816	-	-
	MP3	0.813	-	-
	MP4	0.711	-	-
Factor 1	-	-	7.267	36.3
Factor 2	-	-	3.622	18.1
Factor 3	-	-	1.727	8.64
Factor 4	-	-	1.508	7.54

INN, innovativeness; PRO, proactiveness; RTP, risk-taking propensity; SP, strategic planning; TC, technology commercialisation; PF, policy finance; MS, management support; MP, management performance; RD, research and development; FL, factor loadings.

†, 76.55% of total variance extracted; ‡, 75.40% of total variance extracted; §, 70.62% of total variance extracted.

Assessment of the measurement model

This study assessed common method bias using exploratory factor analysis (EFA) with maximum likelihood. The amount of spurious covariance shared among variables because of the common method used in collecting data is called common method variance (Buckley, Cote, & Comstock, 1990). The factor analysis was executed by the maximum likelihood extraction method with varimax rotation. Varimax rotation was used to identify variables that might indicate potential constructs, and standardised factor loadings were examined at 0.5 and above on each potential construct. The result of a Bartlett's test of sphericity was found to be significant ($\chi^2 = 5361.5$, $df = 76$, $p < 0.001$), while the Kaiser–Meyer–Olkin measure of sampling adequacy was 0.877 for all the variables. The data were therefore suitable for analysis (see Table 2).

Thus, the study checked for possible common method variance with Harman's single-factor test (Podsakoff & Organ, 1986) for (in)dependent variables. According to this approach, common method variance is present if a single factor accounts for the majority of the covariance in the dependent and independent variables. The study found no dominant factor emerging from the factor analysis, implying that common method variance is not a serious problem. An EFA of all of our scale items revealed factors for independent variables explaining 76.55% and the last factor for dependent variables explaining 70.62% of the total variance. This analysis suggested that the data sample used in the study is likely not contaminated by common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

The internal consistency of the measures was evaluated by Cronbach's alpha, which was also used to test the reliability of the study's instruments and, as shown in Table 3, the scale reliabilities (Nunnally & Bernstein, 1994). In all nine constructs, Cronbach's alpha exceeds the standard acceptance norm of 0.70. As shown in Table 3, the study's average variance extracted (AVE) also satisfies the standard of 0.5, which means that the measurement indices satisfy the requirement for convergent validity. The means of the squares of the correlation coefficients (r^2) are smaller than the AVE, resulting in an AVE greater than the means of the squares of the correlation coefficients (r^2), also ensuring that the data collected for verification have sufficient discriminant validity (Bagozzi & Yi, 1988; Fornell & Larcker, 1981; Wixom & Watson, 2001).

Ethical consideration

This article followed all ethical standards for carrying out research.

Results

Hypotheses tests

The causal model's goodness of fit for each measurement model satisfies the criteria (Bentler, 2004).

TABLE 3: Average variance extracted, Cronbach's alpha and correlation matrix.

Variables	A	AVE	1	2	3	4	5	6	7	8	9
INN	0.929	0.753	1	-	-	-	-	-	-	-	-
PRO	0.938	0.733	0.433	1	-	-	-	-	-	-	-
RTP	0.720	0.623	0.110	0.124	1	-	-	-	-	-	-
SP	0.870	0.721	0.229	0.188	0.081	1	-	-	-	-	-
RD	0.913	0.742	0.003	0.001	0.017	0.199	1	-	-	-	-
TC	0.810	0.694	0.281	0.119	0.037	0.301	0.092	1	-	-	-
PF	0.883	0.734	0.241	0.379	0.087	0.088	0.000	0.069	1	-	-
MS	0.872	0.723	0.171	0.147	0.048	0.052	0.013	0.047	0.413	1	-
MP	0.890	0.752	0.203	0.338	0.134	0.141	0.003	0.137	0.287	0.116	1

INN, innovativeness; PRO, proactiveness; RTP, risk-taking propensity; SP, strategic planning; TC, technology commercialisation; PF, policy finance; MS, management support; MP, management performance; RD, research and development.

*, $p < 0.05$.

TABLE 4: Moderating effects of policy financial and management support.

Dependent variables	Interaction effect	<i>a</i>	<i>T</i>	<i>p</i>	Adjusted <i>R</i> ²	<i>F</i>
SP	-	-	-	-	0.215	113.2***
	ENTRE * PF	0.661	12.28	0.000	-	-
	ENTRE * MS	0.271	5.04	0.000	-	-
R&D	-	-	-	-	0.050	3.22**
	ENTRE * PF	0.003	0.053	0.958	-	-
	ENTRE * MS	0.091	1.50	0.133	-	-
TC	-	-	-	-	0.160	78.8***
	ENTRE * PF	0.573	10.29	0.000	-	-
	ENTRE * MS	0.239	4.29	0.000	-	-
MP	-	-	-	-	0.344	72.5***
	SP * PF	0.415	8.173	0.000	-	-
	RD * PF	0.095	2.387	0.017	-	-
	TC * PF	0.260	5.810	0.000	-	-
	SP * MS	0.352	6.165	0.000	-	-
	RD * MS	0.166	3.693	0.000	-	-
	TC * MS	0.253	4.885	0.000	-	-

ENTRE, entrepreneurship; SP, strategic planning capacity; R&D, research and development; TC, technology commercialisation; PF, policy finance; MS, management support; MP, management performance; RD, research and development.

***, $p < 0.001$; **, $p < 0.05$.

Thus, the results show that the study assumptions remain within acceptable boundaries. To test structural relationships, the hypothesised causal paths were estimated. The results are shown in Table 4 and Figure 2. The causal model's goodness of fit is indicated by $\chi^2 = 1023.5$, $df = 532$, $p = 0.000$, CFI = 0.950, GFI = 0.932, AGFI = 0.913, NFI = 0.927, NNFI = 0.932, SRMR = 0.091 and RMSEA = 0.053. Thus, the assumptions remain within acceptable boundaries.

Hypothesis 1 assumes that entrepreneurship has a significant influence on strategic planning. The results indicate that entrepreneurship has a positive effect on strategic planning (path coefficients: $\gamma = 0.504(0.582)$, $z = 16.71$, $p < 0.001$). Hypothesis 2 assumes that entrepreneurship has a significant influence on R&D. The results indicate that entrepreneurship has a positive effect on R&D (path coefficients: $\gamma = 0.075(0.108)$, $z = 2.152$, $p < 0.05$).

Hypothesis 3 assumes that entrepreneurship has a significant influence on technology commercialisation. The results indicate that entrepreneurship has a positive effect on technology commercialisation (path coefficients: $\gamma = 0.453(0.642)$, $z = 14.52$, $p < 0.001$). Thus, H1, H2 and H3 are supported.

Hypotheses 4-1, 4-2 and 4-3 assume that managerial innovation capacity (e.g. strategic planning capacity and R&D capacity) have positive effects on management performance (path coefficients: $\beta = 0.309[0.294]$, $z = 7.719$, $p < 0.001$ for strategic planning; path coefficients: $\beta = 0.157[0.120]$, $z = 4.482$, $p < 0.001$ for R&D; path coefficients: $\beta = 0.248[0.192]$, $z = 6.586$, $p < 0.001$ for technology commercialisation). Thus, H4-1, H4-2, and H4-3 are supported.

To test hypothesis 5, the study conducted a mediated hierarchical regression analysis to verify the moderating effect of policy financial and management support. The fifth hypothesis posited that when entrepreneurship affects managerial innovation activities, policy financial support and management support will serve as moderators.

Table 4 shows the results of the mediated hierarchical regression analysis performed to verify the hypothesis. The statistical significance of the regression coefficient for interactions between the moderator variables and independent variables was verified. The regression coefficient for interactions between entrepreneurship and policy financial and management support is statistically significant at $\beta = 0.661$, $t = 12.28$, $p < 0.001$ for policy financial support and $\beta = 0.271$, $t = 5.04$, $p < 0.001$ for management support for strategic planning.

The regression coefficient for interactions between entrepreneurship and policy financial and management support is not statistically significant at $\beta = 0.003$, $t = 0.053$, $p = 0.958$ for policy financial support and $\beta = 0.091$, $t = 1.50$, $p = 0.133$ for R&D for management support. The regression coefficient for interactions between entrepreneurship and policy financial and management support is statistically significant at $\beta = 0.573$, $t = 10.29$, $p < 0.001$ for policy financial support and $\beta = 0.239$, $t = 4.29$, $p < 0.001$ for management support for technology commercialisation.

The regression coefficient for interactions among strategic planning capacity, R&D capacity and technology commercialisation capacity as subelements of managerial innovation activities and policy financial support is statistically significant at $\beta = 0.415$, $t = 8.173$, $p < 0.001$ for strategic planning capacity; $\beta = 0.095$, $t = 2.387$, $p < 0.05$ for R&D capacity; and $\beta = 0.260$, $t = 5.810$, $p < 0.001$ for technology commercialisation

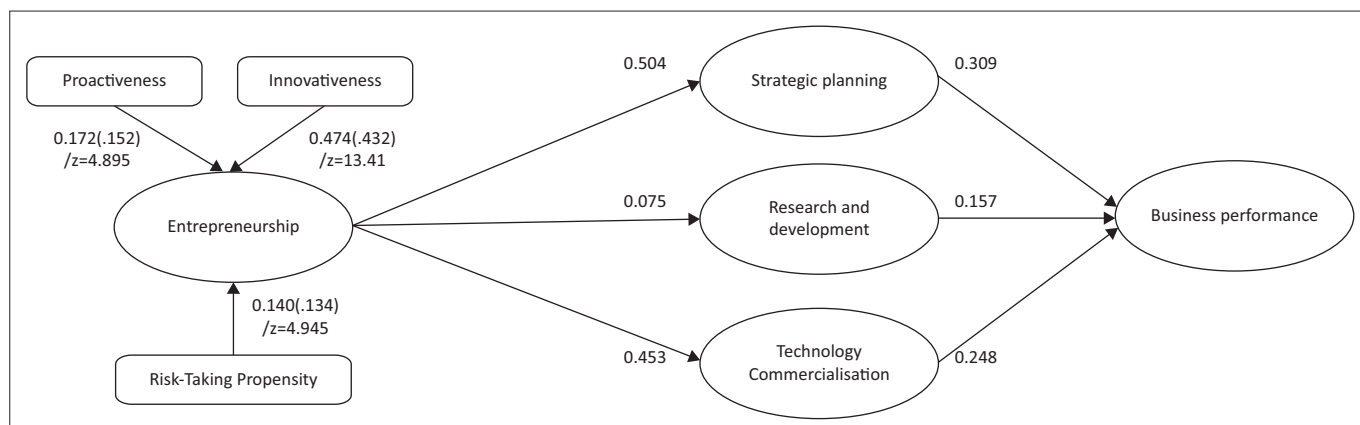


FIGURE 2: Path coefficients.

TABLE 5: Effect of entrepreneurship on managerial innovation activities.

Variable	Items	B	β	SE	t	p	Adjusted R ²	F
Strategic planning	-	-	-	-	-	0.001	0.263,	78.0
(Constants)	-	1.165	-	0.175	6.660	0.000	-	-
Entrepreneurship	Innovativeness	0.311	0.325	0.049	6.368	0.000	-	-
	Proactiveness	0.174	0.178	0.050	3.461	0.001	-	-
	Risk-taking	0.163	0.163	0.040	4.127	0.000	-	-
Research and development capability	-	-	-	-	-	<0.001	0.016	7.39
(Constants)	-	2.295	-	0.247	9.240	0.000	-	-
Entrepreneurship	Innovativeness	0.190	0.165	0.069	2.754	0.006	-	-
	Proactiveness	0.166	0.142	0.071	2.341	0.020	-	-
	Risk-taking	0.162	0.135	0.056	2.891	0.004	-	-
Technology commercialisation	-	-	-	-	-	0.001	0.552	77.68
(Constants)	-	1.224	-	0.199	6.165	0.000	-	-
Entrepreneurship	Innovativeness	0.585	0.539	0.055	10.57	0.000	-	-
	Proactiveness	0.005	0.005	0.057	0.091	0.927	-	-
	Risk-taking	0.045	0.040	0.045	1.00	0.318	-	-

B, unstandardised coefficient; β, standardised coefficient; SE, standard error.

capacity for management performance. The regression coefficient for interactions among strategic planning capacity, R&D capacity and technology commercialisation capacity as subelements of managerial innovation activities and management support is statistically significant at $\beta = 0.352$, $t = 6.165$, $p < 0.001$ for strategic planning capacity; $\beta = 0.166$, $t = 3.693$, $p < 0.001$ for R&D capacity; and $\beta = 0.253$, $t = 4.885$, $p < 0.001$ for technology commercialisation capacity for management performance. Thus, these results support H5-1, H5-3, H6-1, H6-2, and H6-3, but not H5-2.

Additional analysis

This study sought to test the relationship between entrepreneurship and managerial innovation activities.

Table 5 shows the results of a regression analysis performed to verify the first hypothesis, which predicts that the factors comprising entrepreneurship (innovativeness, proactiveness and risk-taking) will have positive effects on strategic planning capacity, R&D capacity and technology commercialisation capacity, subfactors of managerial innovation activities. The tests for hypotheses 1, 2 and 3 were conducted on the relationship between entrepreneurship and managerial innovation activities using regression analysis.

Innovativeness, proactiveness and risk-taking as subfactors of entrepreneurship positively affected strategic planning capacity as a subfactor of managerial innovation activities ($\beta = 0.325$, $t = 6.368$, $p < 0.001$; $\beta = 0.178$, $t = 3.4621$, $p < 0.05$; $\beta = 0.163$, $t = 4.127$, $p < 0.001$; adjusted $R^2 = 0.263$, $F = 78.0$, $p < 0.001$). Innovativeness, proactiveness and risk-taking as subfactors of entrepreneurship positively affected R&D capability as a subfactor of managerial innovation activities ($\beta = 0.165$, $t = 2.754$, $p < 0.05$; $\beta = 0.142$, $t = 2.341$, $p < 0.05$; $\beta = 0.135$, $t = 2.891$, $p < 0.05$; adjusted $R^2 = 0.016$, $F = 7.39$, $p < 0.001$). Innovativeness as a subfactor of entrepreneurship positively affected technology commercialisation capacity as a subfactor of managerial innovation activities ($\beta = 0.539$, $t = 10.57$, $p < 0.001$, adjusted $R^2 = 0.552$, $F = 77.68$, $p < 0.001$). However, proactiveness and risk-taking as subfactors of entrepreneurship did not positively influence technology commercialisation capacity as a subfactor of managerial innovation activities ($\beta = 0.005$, $t = 0.091$, $p = 0.927$; $\beta = 0.040$, $t = 1.00$, $p = 0.318$).

Discussion and conclusion

This study attempts to explore the role of entrepreneurship and managerial innovation capacity in management performance by examining the moderating effect of policy

finance and management support. The study found that entrepreneurship is closely related to managerial innovation capacity, such as strategic planning, R&D and technology commercialisation. The results of the study revealed that when entrepreneurship affects managerial innovation activities, policy financial support and management support serve as moderators.

From these results, factors affecting innovativeness and entrepreneurship appear to include efforts to brainstorm ideas for new product development, implementation and development of new production or operational systems and promotion of consumer-oriented mindsets and marketing activities. Such mindsets possessed by managers of SMEs are core factors in strategic planning, R&D and technology commercialisation.

Instilling such an innovative tendency in managers lays the groundwork for the intention to develop new products, analyse market situations, conduct R&D, use information analysis and commercialise technologies. Ultimately, managerial innovation capacity differs according to managers' innovative tendencies.

Factors related to the proactiveness of entrepreneurship include finding new opportunities, responding to environmental changes and developing a future-oriented attitude. Managers of SMEs who develop or embrace entrepreneurship can be seen as actively engaging in analysis of future markets and cultivating the ability to form new product ideas. Entrepreneurs who actively prepare for an uncertain future show increased managerial innovation capacity. However, in this study, the proactive and risk-taking attributes of entrepreneurs did not affect technology commercialisation in SMEs. This finding could be interpreted as indicating the risk-averse tendency of SMEs when considering commercialising of technologies. On the contrary, SMEs tend to rely on the technologies of conglomerates, or they operate wholesale and retail trade or service businesses, in which developing and commercialising technologies have little value. Because managerial innovation capacity helps an enterprise develop new ideas, production methods and products; carry out market analysis; cultivate a consumer-oriented mindset; and conduct technology analysis, and because these activities are directly linked to management performance, an enterprise's overall performance can be improved by increasing such activities. Increased intention, passion and effort in building innovation capacity imply greater anticipation on the part of managers. Thus, they are directly connected to management performance.

Policy finance provided by policy financing agencies, a perceived possibility selected as a moderating variable, includes loans, credit guarantees and trade credit insurance. Management support provided by policy financing agencies, non-financial support, includes management consulting; marketing support; education programmes; and maintenance, repair and operations support. Such policy finance and

management support are closely connected to management performance in SMEs. For these enterprises, obtaining support, such as loans, credit guarantees and trade credit insurance from policy financing agencies, enables them to improve management performance.

When strategic planning capacity and technology commercialisation capacity, subfactors of managerial innovation capacity, affect management performance, policy finance and management support provided by policy financing agencies play a moderating role. This means that the strategic planning capacity or technology commercialisation capacity of SMEs contributes to management performance through policy finance and management support. However, when R&D capacity, a subfactor of managerial innovation activities, affects management performance, policy finance and management support do not play a moderating role. This finding indicates that SMEs need R&D capacity to achieve competitiveness. Because R&D capacity in SMEs is reinforced more by the technological support of conglomerates and joint R&D projects with national R&D agencies than by financial support and management support from policy financing agencies, the role of policy financing agencies must be limited.

Theoretical and managerial implications

In this study, managerial innovation activities were divided into three subfactors – strategic planning, R&D and technology commercialisation – to determine their relationships with management performance. In addition, entrepreneurship is also divided into three subfactors – innovativeness, proactiveness and risk-taking – to analyse their relationships with managerial innovation activities and management performance. Although there are differences across enterprises according to their attributes, managerial innovation activities, policy finance and management support were found to be closely connected to management performance in this study.

It would be useful to conduct in-depth follow-up studies by further subdividing the factors comprising managerial innovation capacity.

Based on the results of this study, SMEs should enhance their innovation capacity and expand innovative entrepreneurship and policy finance to achieve competitiveness, survive and show continuous development and growth in a changing environment. The practical results of this study are as follows: firstly, the study provides SMEs with information they can use to increase their awareness of internal managerial innovation activities, which are the original sources of competitive advantage, and help promote R&D and organisational management for continuous reinforcement of innovation capacity. Secondly, this study suggests that SMEs should utilise various external resources, such as policy financing agencies, to improve management performance through managerial innovation activities. Thirdly, the results should make SME managers, including CEOs, aware that

creative and innovative entrepreneurship is directly related to survival and that managerial innovation activities are important methods for overcoming the intrinsic limitations of SMEs.

The managerial environment in which SMEs operate has recently deteriorated with intensifying competition. Entrepreneurship and managerial innovation activities have become very important to SMEs seeking to actively respond to such timely trends and continuously survive and develop in an increasingly uncertain environment. Innovative entrepreneurship is even more necessary to turn managerial innovation capacity into management performance. To help SMEs achieve competitiveness and continuous growth in such a rapidly changing managerial environment, this study aimed to examine the effects of entrepreneurship on managerial innovation activities, the effects of managerial innovation activities on management performance, and the moderating role of policy finance and management support.

The results of this study suggest that entrepreneurship is closely related to managerial innovation activities and management performance. Policy finance and management support were found to play a moderating role in the relationship between managerial innovation activities and management performance.

Management performance in SMEs can be said to start with innovative entrepreneurship and maximised internal and external managerial innovation activities. Subfactors of entrepreneurship were mostly found to have positive effects on managerial innovation activities. These results demonstrate that entrepreneurship and managerial innovation activities have a complementary relationship. Therefore, entrepreneurship on the part of SME managers has mutual relationships with most managerial innovation activities and affects management performance. This study suggests that SMEs, to have a competitive advantage, should pay more attention to managerial innovation because of its great importance to business performance.

Directions for future research

Significantly, this study is subject to several limitations. The first limitation lies in the concepts of entrepreneurship used in this study. Various aspects of entrepreneurship have been studied continuously by many researchers. However, based on previous studies, this study adopted innovativeness, proactiveness and risk-taking as the core concepts underlying entrepreneurship. Follow-up studies must identify subfactors of entrepreneurship by comparatively analysing the concepts of entrepreneurship from classical and contemporary economics. Additional studies are needed to form the logical foundation to model abstract and descriptive concepts of entrepreneurship.

Secondly, the significance of this study is that managerial innovation activities were subdivided, and entrepreneurship

in SMEs was empirically analysed. However, the latest research trend for these two factors is the use of a multidimensional approach to managerial innovation capacity and entrepreneurship. Therefore, in the future, subfactors of entrepreneurship and managerial innovation capacity must be developed using alternative approaches. Considering the attributes of enterprises that participated in this study, strategic planning, R&D and technological commercialisation are important factors affecting managerial innovation activities.

However, because the managerial environment in which SMEs operate can change and attributes may differ across enterprises, the development of subfactors must be carried out more carefully.

Thirdly, this study was conducted only with SMEs. There is a need for a study that comparatively analyses entrepreneurship and managerial innovation activities of SMEs, mid-sized enterprises and conglomerates. A study limited to SMEs cannot adequately represent all enterprises in South Korea.

Fourthly, two perceived possibilities were selected as moderating variables in this study. These perceived possibility factors were policy finance and management support provided by policy financing agencies.

However, the SMEs that participated in this study were either receiving or had experience receiving government support. The necessity and usefulness of policy finance and management support were not reflected in the process of analysing the effects of moderating variables. The performance of SME managers can differ by necessity, usefulness and participation of government and policy financing agencies. Accordingly, future studies should rearrange and analyse such factors as moderating variables to draw more specific policy implications for policy finance and management support.

The final limitation of this study worth mentioning involves the method of measuring management performance. In general, management performance is measured by either objective evaluation of financial performance or subjective evaluation of non-financial performance. In this study, management performance was measured using financial and non-financial indicators. Financial performance must be measured objectively based on financial statements and measurable enterprise performance, but here it was measured using subjective and qualitative evaluation methods. Qualitative measurement is also important, but it is necessary to comparatively analyse management performance from objective and diverse perspectives using measurable indicators based on financial statements.

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Competing interests

The authors have declared that no competing interest exists.

Authors' contribution

C.-H.J., the first author, was responsible for sharing his conceptual idea for the writing of this article. L.-J.Y. performed the survey and analyzed the data and contributed to parts of the conclusions. Both authors made contributions to the work in this study.

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Data availability statement

Data sharing is not applicable to this article as no new data were created or analysed in this study.

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Appendix 1

TABLE 1-A1: Measurement tools.

Variable	Items
Entrepreneurship	
Innovativeness (4)	How innovative is your organisation? To what extent is your organisation searching for entrepreneurial opportunities? To what extent has your organisation placed emphasis on new programmes/services/administrative techniques and procedural changes? To what extent does your organisation have fee-for-service operations?
Proactiveness (4)	To what extent did your organisation implement new programmes and services in the past 3 years? To what extent did your organisation implement new administrative techniques and procedural changes within the past 3 years? To what extent does your organisation take entrepreneurial opportunities to initiate new programmes/services and changes to techniques? To what extent does your organisation take entrepreneurial opportunities to initiate procedural changes?
Risk-taking propensity (4)	To what extent does your organisation have a propensity for risk-taking? To what extent does your organisation tolerate failure? To what extent does your organisation tend to take on high-risk projects? To what extent are most employees not afraid to take risks?
Managerial innovation	
Strategic planning (6)	To what extent does your organisation have a high level of analytical capability with new product technology? To what extent does your organisation have a high level of analytical capability with new business? To what extent does your organisation establish a new business entry strategy for technological innovation? To what extent does your company have a long-term strategy for technology development? To what extent does your organisation have a high level of analytical capability with external information and trends? To what extent does your organisation have a high level of analytical capability with acquired external information?
Research and development (6)	To what extent does your organisation have a high level of human resources for research and development? To what extent does your organisation have a high percentage of research and development staff? To what extent does your organisation have a high level of experience among members involved in research and development? To what extent does your organisation have a high level of education among members involved in research and development? To what extent does your organisation have a high level of research performance among members involved in research and development? To what extent does your organisation have high research and development investment compared to that in sales?
Technology commercialisation (3)	To what extent can your organisation design, apply and improve flexible production processes and production systems? To what extent does your organisation have good-quality management and guarantee service? To what extent is your organisation capable of procurement and outsourcing of raw materials, materials and parts?
Policy financial support (5)	Loan support from policy financial institutions (KDB, KIC) helped the business. Assurance support from credit bureaus (newspaper, notation, foundation) helped the business. Credit guarantee and technology guarantee systems are essential for business success. Credit guarantee fund's trade bond insurance helped the business. The credit guarantee fund's trade receivable insurance system is essential for business success.
Management support (3)	Training on policy financial institutions' business (chief executive officer, production, expertise, certification, management education, etc.) helped the business. Support for business-related information by policy financial institutions helped the business. Business mentoring supported by policy financial institutions (planning, consulting, networking, branding and marketing).
Management performance	The profitability of our company is increasing. The productivity of our company is increasing. Our company is consistently increasing its customer base. Our company is expected to show an increase in brand awareness.