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Article

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Article

Innovative Capacity and the Performance of Businesses Incubated in University Incubator Units: Empirical Study from Universities in Thailand

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Abstract: The purpose of this research is to study the factors related to the performance of the entrepreneurs who passed through the stages of business development at the university business incubators in Thailand. These factors consist of various characteristics, namely, leadership orientation, entrepreneurial orientation, network capacity, and innovative capacity. The sample group consisted of 220 businesses that had passed through a university business incubator in Thailand. The SPSS Statistics program calculated the basic statistics, as well as the relationship test for each factor studied, and examined the statistics using a structural equation model (SEM). The results revealed that the characteristics of leadership orientation, entrepreneurial orientation, network capacity, innovative capacity, and entrepreneurial performance had relationships in the same direction. Furthermore, an analysis of the relationships between the factors found that entrepreneurial orientation had positive relationships with network capacity and innovative capacity, leadership orientation had positive relationships with innovative capacity and entrepreneurial performance, and innovative capacity had a positive relationship with entrepreneurial performance. These relationships summarize a developmental model for the innovative capacity and performance of businesses that have passed through the university business incubators in Thailand.

Keywords: entrepreneurial orientation; innovative capacity; business performance; university business incubator; open innovation

1. Introduction

Although many research organizations have the potential to develop technologies for various types of markets, they are not able to apply that technology or knowledge to reap the maximum commercial benefits. For example, consider a university that is capable of carrying out research related to the discovery of high heat resistant materials; that research will not acquire its greatest benefits until an external organization takes that method of material production and applies it to their products—for instance, when a company producing tiles or bricks for construction uses this research to produce tiles and bricks with high heat resistance. Therefore, the quickest way to become an innovative organization is to create differentiated products, and to enter into novel markets that are accessible to consumers, and to ask for innovation support from educational research institutes [1–3].

Generally, universities contribute considerably to research; therefore, if there is cooperation between a business and a university, the university will become a crucial part of the research that develops future products [4]. The readiness of the university, in this aspect, will affect innovative

development in the region around the university [5]. The quickest way to encourage organizations to innovate their products, or to enter into novel markets that are quickly accessible to consumers, is to request the promotion of information from educational research institutes [1–3]. China and Taiwan have both been regarded as countries that emphasize the importance of university innovation, and they have been accelerating cooperative development between universities and businesses so they can successfully produce innovative products.

The institutional mechanism of university–industry linkage provides great incentive and opportunity for commercialization and fosters a stronger spirit of entrepreneurship in Taiwan [2].

Accordingly, the effective management of the nexus of university–industry–government relations, which could affect the development of a national innovation system, becomes important when investigating the relationship between innovative economy and performance. On one hand, there are over 70 university-based incubation centers in Taiwan, each with a diversified combination of knowledge, as every department within a university has its own specialization and different strategic development goals. In this context, incubation centers can perform not only the function of professional knowledge sharing and communication, but also the function of knowledge coordination. Consequently, this leads to entrepreneurial organizations or projects being firmly rooted in the knowledge network composed of transparent professional knowledge and official information [6].

Hu and Mathews [1] stated that universities in China play an important role in creating new businesses. Many emerging businesses arise from the creation of business in the university or result from the collaboration between external agencies and universities, becoming a major innovation model in China. In addition, research results on the topic of “academic collaborations and firm innovation performance in China” found that collaborations between businesses and educational institutions resulted in an increased capacity for innovation, as collaboration creates knowledge and technology exchange, as well as affects learning and innovation development [5].

2. Theoretical Background

2.1. Universities and Innovative Development

Liefner and Schiller [4] studied the competency of educational institutes in developing countries by collecting data from Thailand. They found that educational institutes were able to develop external organizations directly by training knowledgeable and skilled personnel, who were then able to apply their knowledge to develop the organizations further. A case study in Brazil looked at the transfer of innovative development from a university to an external organization. It revealed that one of the factors affecting the success of innovative transfer was the construction of an environment, such as an industrial garden or incubated resource, which gave external entrepreneurs the opportunity to regularly learn about innovations, in order to prepare them to develop the ideas and extend the knowledge of the organization further [7].

A university that creates an environment within the private sector (i.e., in the form of a science park) enhances its ability to transfer knowledge, technology, and innovation more effectively [8]. This is in accordance with Ortega and Bagnato [7], who suggested that a factor that made the transfer of innovation from a university successful was the creation of such an environment, such as an industrial garden or an incubator. Providing an opportunity for external entrepreneurs to learn about innovations regularly prepared them to take innovations, develop them, and extend the knowledge to their organizations. Díez-Vial and Montoro-Sánchez [8] indicated that an environmental construction, such as a science park, would enhance the ability of a university to transfer innovation successfully to external organizations.

2.2. Business Incubator Unit of Universities in Thailand

Professor Dr. Phawit Tongroj [9], Former Secretary of the Office of the Higher Education Commission, who initiated the universities business incubator project in Thailand, mentioned research

in the universities of Thailand, in that there are numerous universities which are able to construct high-quality research. However, the problem is that, in Thailand, there is a lack of connection between the universities and entrepreneurs, which causes numerous studies to have not been transferred to external organizations as innovations for commercial value. Meanwhile, the universities, themselves, have not been able to develop their own research contributions to the commercial process. This differs from foreign countries that have established processes to assist entrepreneurs in utilizing university research by the strategic establishment of incubator units in order to provide opportunities for new business units; that is, to be able to cooperate and further develop the existing research as commercial products and services

In 2004, the Office of the Higher Education Commission initiated the “university business incubator (UBI)” project, for those higher education institutes who were interested and ready to establish a UBI in their universities. The Office of the Higher Education Commission provided some of the budget for the establishment of the UBIs (the rest of the budget was from the universities) and publicized additional knowledge and training to the personnel of the willing universities (Office of the Higher Education Commission, n.p.)

At present, there are a total of 56 UBIs established all over the country, and there are a substantial number of entrepreneurs who have participated in the business and innovation training, until they were capable to develop themselves as entrepreneurs who could genuinely conduct a business.

2.3. Leadership Characteristics

For a business to succeed, it relies on the people who are creative, inspirational, determined, enthusiastic, and able to adapt to changing environments in order to create novel products and innovations [10]. As the business owner or entrepreneur, a leader has to facilitate and involve workers including being the person who manages new opportunities and applies them to the performance of the business, as well as adjusting themselves appropriately to existing risks at all times [11].

Griffiths [12] gave the following seven characteristics of a leader: 1) A leader has to have initiative; 2) a leader has to encourage mutual performers, especially subordinates; 3) a leader always admires and gives moral support to performers; 4) a leader has to be ready to solve the problems of their subordinates; 5) a leader has to be able to persuade others to perform mutual tasks; 6) a leader has to coordinate internal and external organizations to perform tasks simultaneously; and 7) a leader has to be sociable.

Good leaders must be able to motivate their subordinates to unite in harmonious performance. Following these ideas will result in an organizational culture that is constructed with standards. Researchers have focused on two characteristics of leadership orientation, which are: 1) The personal skills of business leaders, including sub-components such as being open-minded and listening to the opinions or work-intentions of others; and 2) the social capacity of leaders, including sub-components such as the capacity to build teams or enhance employee performance [10–12].

Bate [13] stated that culture and strategy cannot be completely separated from each other. This is because culture will always affect the strategies used. Therefore, cultural changes will also result in changing strategies as well, which is consistent with the results of research on the quality of organizations by Zabid et al. [14]. A strategy for the success of an organization must begin with an understanding of corporate culture, then applying the characteristics of those organizational cultures to formulate an appropriate strategy for the organization. For implementation of the appropriate strategy, practitioners (or those in the entrepreneurial organization, at all levels) must also follow the good features of entrepreneurship, such as proactive work, courage to decide, and being ready to accept risks. These factors should be strengthened to become an important part in the culture of the organization and in the ability of executive leadership. Leaders with good leadership qualities are part of the type of corporate culture that is essential in creating a strong culture in the organization [15], as well as creating entrepreneurship for all levels of employees in the organization. According to research

by Altinay and Wang [16], the business experience of the leaders of an organization is an important factor, which will foster good attributes and entrepreneurship in the business.

2.4. Entrepreneurial Orientation

Many researchers have given a variety of meanings to entrepreneurs, such as Schumpeter, who defined the meaning of an entrepreneur to be an initiator, using the process of discrimination of existing products and services to create new products and services. There are five methods of classifying entrepreneurs, which are: (1) Those who offer new, quality products; (2) those who use new methods of production; (3) those who use a new opening in the market; (4) those who find new sources of raw materials or search for new raw materials; and (5) those who establish new businesses [17]. McClelland [18] described an entrepreneur as a person who seeks success by being an enthusiastic and moderate risk-taker.

The different meanings given by researchers are consistent in the same direction. Therefore, the author summarizes the meaning of an entrepreneur as follows: “People who seek success by being an initiator, who are enthusiastic, who can accept risks, and who have the ability to create new processes or products, including creating new businesses. The entrepreneur may be an individual or may be established as a business organization, such as in the establishment of a partnership or company”.

From the meaning of the entrepreneur, one will find that one of the features that they must have is the readiness to take risks, as creating a new business will face uncertainty from the external environment, including the factors within the organization of the entrepreneur himself. Therefore, there are researchers trying to find a good model for entrepreneurs, which should describe who will be successful in business, is of a form that has present relevance, and which will be accepted with the further research and development of such ideas as entrepreneurial orientation.

Entrepreneurial orientation is an old idea. Miller and Friesen [19] defined entrepreneurial orientation as the processes, practices, and decisions that lead to the establishment of new businesses. They followed Lumpkin and Dess [20], who introduced the concept that an entrepreneurial orientation involves an attempt to discover and perform new things. Moreover, entrepreneurs must analyze risks and act proactively, including performing more quickly than their rivals to obtain better marketing opportunities.

Entrepreneurial orientation includes details that can be considered separately—item by item. For example, some academics have proposed that entrepreneurial orientation consists of two components, risk daring and proactive performance [21,22].

Several academics have proposed mutually concordant concepts, but with additional orientations; for instance, the idea that entrepreneurs should have three components: bravery, proactive performance, and innovation construction [19].

Lumpkin and Dess [20] suggested that the positive characteristics of entrepreneurial orientation consist of five components, which include independence of management, capacity for innovative construction, proactive performance, competitive capacity with business rivals, and capacity to confront risks.

Covin and Slevin [23] indicated that there are three orientations that reflect the executive orientations of entrepreneurs. First, entrepreneurs of every level of an organization must let the products undergo technological and innovative development. Second, entrepreneurs must be ready to confront the risks of decision making, as they need to make various decisions on strategic performance, including the decision to invest when external environments are uncertain. Third, entrepreneurs should have personality traits that express their proactive performance. They must be ready to compete with other businesses in the market. If they cannot work proactively, their organizations will not be able to compete with rivals quickly enough.

Previous research has identified that entrepreneurial orientation focuses on the capacity to make a business successful by having an organizational leader as a crucially involved factor. Hence, researchers have concluded that there are four essential items that can be used to identify entrepreneurial

orientation, which are: 1) creativity, 2) proactive performance, 3) competitive capacity, and 4) capacity for risk [19–23].

2.5. Capacity of Business Networking

An open innovation system is a developmental model of an innovation system in every aspect, including management that emphasizes mutual information exchange, such as information exchange between internal departments within the organization, or the organization and other external organizations. This is a popular innovation system at present, because the information exchange factor encourages all organizations to increase their opportunities to select creative work or innovations from outside the organization, and to adjust appropriately toward the utmost effectiveness and efficiency. In addition, if an organization can create excessive creative contributions, it can benefit from those creative contributions by selling its copyrights or patents to other organizations.

Networking with external organizations is crucial to business performance in an open innovation society, because cooperation with external networks increases the knowledge in an organization. When all known and previously unknown knowledge is integrated, increasingly novel innovations can be developed. Cooperation with external innovative organizations enhances how the business perceives the needs of those organizations, and allows it to use all its knowledge and abilities to respond to the needs of external organizations and create innovative products or novel innovations that can increase the income of the business and obtain immediate market support [24].

An open innovation system relies on the exchange of knowledge between society and the networks in internal and external organizations [25]. Moreover, if an organization supports knowledge management and the process of information exchange between internal and external organizations, it will also increase its innovative capacity [26]. By using business networking, organizations can build various forms of cooperation; for example, using a Memorandum of Cooperation or any other contract, which creates good connections between one organization and an external organization and promotes sharing aspects of development or exchanging information with each other.

Inter-business networking should coincide with other processes that help to originate innovation. Networking must be supported by executives and, in fact, all of the sectors in the organization, by adjusting the structures and models of performance to facilitate coordination and information exchange. This might happen within the departments of the organization, including inter-organizations [27]. When a business organization networks, it does not go into business alone, but it has external organizations to rely on and exchange knowledge with. This helps the business to develop allies with whom it can perform various mutual activities, such as marketing. These results will help the business achieve sustainable success [28].

2.6. Business Innovative Capacity

Innovation is still considered a crucial factor to creating sustainable and competitive advantages for organizations [29]. The measurement of capacity of organizational innovation should tie together practically with other aspects of performance measurement. This is because innovation is a component of performance effectiveness of an organization as a whole [30]. Innovative capacity is comprised of parts that can be adjusted according to the subjects required for the study; for instance, innovative capacity might consist of marketing capacity and technological capacity [31]. Lyon et al. [32] categorized two aspects of innovative capacity in terms of products and processes. The study of North and Smallbone [33] classified innovative capacity into four aspects, comprised of the innovative capacity of products, capacity, and behavior. In addition, Wang and Ahmed [34] divided innovative capacity into the following five aspects: product innovativeness, marketing innovativeness, process innovativeness, behavior innovativeness, and strategic innovativeness.

Innovative capacity can be measured from the innovative results of the research and development process by comparing it with the investment in that process. The results might be in the form of raw materials, a developed process, or the addition of innovation into products or processes [31,35,36].

This follows Castellacci and Natera [37], who found three main variables related to innovative capacity, which consisted of input factors into the system, scientific invention, and technological invention. In some cases, organizations use innovation as parts of other components; for example, Aujirapongpan et al. [38] wrote that innovative performance in the context of small- and medium-sized enterprises, could be categorized into three parts: 1) construction of added value and contributions/patents, 2) cost reduction and production upgrades or service quality, and 3) new marketing.

There have been differences in expert definitions of innovative capacity, depending on the purposes of each study. Therefore, there is still no clear conclusion on the definition of innovative capacity [39]. However, one thing that can be observed from the definitions of innovative capacity is that it is typically sub-classified into sub-level innovative capacities. The researchers who have studied it have the same general direction for its model. Thus, researchers, as a group, have organized innovative capacity in the same way; but some select groups were more appropriate to the businesses of entrepreneurs incubated by incubator units at universities. By this method, innovative capacity, in this paper, is divided into the following three groups: (1) process innovation capacity, (2) production innovation capacity, and (3) marketing innovation capacity.

2.7. Business Performance

The first goal of business establishment is usually to generate profit for the business owners or co-investors. In order to measure profits, different durations may be used (such as in quarterly or annual profit analysis), or profits may be compared with past data (such as a comparison with the profits of previous years) to observe the growth of the business. There are currently no standardized criteria or theories for business performance measurement or any that are mutually used with businesses. For this reason, some researchers have been attempting to create a standard to measure business performance, in order to be able to evaluate the effectiveness of management and the performance of the business thoroughly, in every aspect. One widely used method is the balanced scorecard (BSC) technique. Researchers have used BSC as their main method, adjusting parts of it from prior research related to the performance measurement of businesses.

Kaplan and Norton [40,41] created the BSC technique. Their method does not rely only on financial measurements of the organization, but instead uses other components to measure the effectiveness of the organizational performance. Janchai [42] concluded from the concepts and management principles of BSC that it is divided into four perspectives, which are:

1. Financial perspective: This is considered to be crucial, especially in a for-profit organization, because a financial perspective will indicate whether the given and applied strategies had positive impacts on organizational performance. Financial strategies are comprised of two essential objectives—increasing income and decreasing cost.

2. Customer perspective: This is focused on responding to customer needs. Groups of customers are selected to predict their responses, as well as to look for whether the values proposed by the organization respond to the needs of the customers.

3. Internal business process perspective: This perspective considers the crucial process of the internal business, which helps the business propose values concordant with customer needs, as well as helping to achieve other aspects in terms of the purpose of the business.

4. Learning and growth perspective: This is considered as a crucial perspective for the future of the business relating to personnel management, the information database system, the motivation system, and structural organization. Relating to personnel resources, it states that, for the organization to achieve the objectives of the other perspectives, the most important factor in the organization is its personnel. The crucial indicators include the skills and capacities of employees, their satisfaction and attitudes, and their turnover rate.

3. Research Objectives

To study the factors related to the innovative and entrepreneurial performances of businesses incubated by the incubator units of universities.

4. Conceptual Framework and Research Hypothesis

From a study of the literature and related research, it was found that there are various factors that have relationships to each other, which can be used to study the present issues of interest. The details are provided below.

4.1. Leadership Orientation and Entrepreneurial Orientation

The characteristics of being a good entrepreneur is relevant to the management of the entire organization, which consists of many relevant features, such as risk taking, courage to decide development readiness, proactive work creativity, and so on.

Bate [13] said that culture cannot be separated from strategy perfectly, as culture always affects the strategies used. Therefore, cultural change will affect a change of strategy. The quality of an organization was studied by Zabid et al. [14], who found that, in an organization, the design of a successful strategy must start with an understanding of the corporate culture and apply those characteristics to formulate an appropriate strategy for that organization. For the implementation of the appropriate strategy, practitioners (or those in the organization of entrepreneurs at all levels) must also follow the good features of entrepreneurship, such as proactive work, courage to decide, and readiness to accept the risks that may occur. These factors will be strengthened to become an important culture in the organization.

Leaders with good leadership qualities are those who play an important role, which will lead to the building of a strong organizational culture and create good entrepreneurs at all levels of the organization [15]. Moreover, according to a research by Altinay and Wang [16], the business experience of the leaders of an organization is an important factor in creating good attributes and entrepreneurship in established businesses.

From these relationships, the author has set the first hypothesis, as follows:

H1: *Leadership orientation has a positive relationship with entrepreneurial orientation.*

4.2. Leadership Orientation and Innovative Capacity

Leaders with distinctive features in innovation will have the ability to create a specific teamwork style. For a given team, there is an appropriate way to organize the management structure or the organizational structure. When working together, information, ideas, and experiences are exchanged [43]. These are the critical factors that will lead to the creation of an open innovation system.

Visionary leadership, with an understanding of work processes, will lead the entire team to clearly see the same goal and collaborate to develop innovations in order to achieve greater success. For this reason, the innovation operation must start from the core management policy. Whether deployment or modification will be successful or not is the responsibility of the management; they must fight and lead the change, and those executives must convince employees to accept the changes. The process is difficult and takes some time, but if it is successful, it will be worthwhile [44]. The results of some studies that focused on the creation of innovative leaders in external organizations found that leadership orientation is an important part of developing both internal innovation and delivering innovation outside the organization [45].

From these relationships, the author has set the second hypothesis, as follows:

H2: *Leadership orientation has a positive relationship with innovative capacity.*

4.3. Leadership Orientation and Business Performance

A corporate operation policy is a set of guidelines to guide the practice of an organization. The stated policy will be an important tool, which will result in determining the work methods of personnel, including the direction of the operations of the organization, organizational structure, and various operating policies. The main policies that arise from each organization are determined by the senior management [43]. Support from the top-level leaders is important and must be coupled with operations that support the hierarchy further, which will result in a better organizational performance [46].

Leaders with innovative vision will have the ability to choose to develop the personality of the worker, as appropriate for each person. Not focusing on the development of the organization in one aspect, or hoping to focus only on financial figures, will result in the organization achieving both financial and other performances simultaneously [47].

From that relationship, the author has set the third hypothesis, as follows:

H3: *Leadership orientation has a positive relationship with business performance.*

4.4. Entrepreneurial Orientation and Networking Capacity

Organizational culture is an important fundamental factor, resulting in the creation of networking capacity [48]. The importance of organizational culture is partly based on the leadership ability of executives, including entrepreneurial features enabling employees in the organization to follow and have a personality of entrepreneurship, according to the leaders. These characteristics play a significant role in creating networks between organizations [49].

New policies or new operations cannot be used if employees in the organization are not updated or changed. Various policy guidelines, including the policy of creating a network of innovation, must be accepted at the authority level, and the senior leaders must accept the changes that have occurred [50]. Entrepreneurial orientation must be present at every level. The new generation, with features, leaders, and entrepreneurial orientation will be able to create an organizational structure that is outstanding. Entrepreneurial orientation is moving toward an innovative society supported by many foreign countries, creating a famous network of societies with a networked organization [43,51,52].

From these relationships, the author has set the fourth hypothesis, as follows:

H4: *Entrepreneurial orientation has a positive relationship with networking capacity.*

4.5. Entrepreneurial Orientation and Innovative Capacity

Leaders of organizations with entrepreneurial attributes will be able to create organizations that are capable of higher levels of innovation than those with general leaders. This is because leaders with entrepreneurial attributes look at organizational development from a broad perspective; they have a far-reaching perspective on the development of various aspects outside the organization, as well as the global trends in the area [53]. Entrepreneurial orientation implies flexible work characteristics and accepting that changes can happen at any time, resulting in the acceptance of changes in management, or other aspects, at all times [54]. These are the outstanding features of innovative organizational capabilities.

New-generation leaders, with high leadership qualities, will be able to create a unique corporate culture and lead organizations to move toward an innovative society with various factors faster [43]. Combined with the qualities of highly entrepreneurial orientation, leaders will allow workers, at all levels of the organization, to absorb the changes that occur and be able to learn of the new things that happen, including the changes that have occurred leading to the innovation of the business [55].

From these relationships, the author has set the fifth hypothesis, as follows:

H5: *Entrepreneurial orientation has a positive relationship with innovative capacity.*

4.6. Entrepreneurial Orientation and Business Performance

Baron [53] found that entrepreneurial leaders can create organizations that are capable of innovation, which affects the operations of the businesses. The ability to innovate makes a business ready for changes in various aspects, such as changes in marketing, technology, or governmental policies. Having good readiness will enable the business to appropriately adjust operations in these kinds of situations, thus resulting in successful business performance. In accordance with Khan and Sokoloff [54], who stated that those leaders with high entrepreneurial orientation will be able to conduct business under different environments, including under limitations, with better management efficiency than other personalities, resulting in more successful business operations.

Entrepreneurial orientation will result in workers in the organization having more innovative capabilities, including developing the organization in many aspects, not only in terms of financial success, but in other aspects of the organizational success [56].

From these relationships, the author has set the sixth hypothesis, as follows:

H6: *Entrepreneurial orientation has a positive relationship with business performance.*

4.7. Networking Capacity and Innovative Capacity

An open innovation system requires knowledge exchange through society and networks, both within the organization itself and outside the organization [25]. The innovation process will be very successful when there is close collaboration between organizations and external agencies that can work together in various areas [57]. Rothaermel and Hess [58] found that there are many factors that affect the innovation and innovative capability of the organization. One of the most important factors that has a direct effect is networking capability.

If the organization promotes knowledge management and has an information exchange process between itself and external agencies, it will increase in innovation capability [26]. Yen [59] stated that building networks between departments and exchanging information with more external agencies will generate more successful innovation for the agency, including being able to increase innovation in the long run.

From these relationships, the author has set the seventh hypothesis, as follows:

H7: *Networking capacity has a positive relationship with innovative capacity.*

4.8. Networking Capacity and Business Performance.

In educational institutions, Rakthai and Aujirapongpan [60] stated that universities that can build networks of cooperation with external organizations and develop innovations together with them will make more capital to subsidize the development of research and innovation, rather than research done only in university laboratories. Soetanto and Geenhuizen [61] carried out research on the factors that impact funding for universities, and found that establishing a network of cooperation in developing innovative systems together with other external organizations allowed a university to receive more funding for research. In accordance with this, Abdul Razak and Murray [62] found that building a network between universities promotes financial success and higher funding.

From a business perspective, it was found that, when a firm can create value from knowledge by collaborating with external agencies in various forms (including selling copyright or other forms of work), this will enable the firm to receive monetary returns and develop new innovations [63], which becomes a part of the success of the operations of an organization. Moreover, creating cooperation between organizations and external agencies will enable the firm to forward research results to external organizations, in accordance with the needs and ability to successfully develop the products and create innovative products. The overall result is positive performance of the organization [4,64].

From these relationships, the author has set the eighth hypothesis, as follows:

H8: *Networking capacity has a positive relationship with business performance.*

4.9. Innovative Capacity and Business Performance

Miller and Friesen [19] proposed the idea that an entrepreneur must succeed in creating new innovations in a product or service. It is necessary to have at least three entrepreneurial qualifications: 1) the ability to face risks, 2) proactive work, and 3) innovative capacity. Cremaet al. [65] conducted research to examine the relationship between the factors that affect the performance of businesses that use open innovation systems and found that innovative strategies and innovative capacity were factors that positively impacted business performance. Organizational performance will be directly affected by entrepreneurial innovation [66].

The innovative capacity of an organization is one of the most important elements of every business, as innovative capacity is a crucial factor affecting the business performance [21,67]. Innovative capacity is a factor that enables businesses to define strategies that are important for achieving long-term success [68]. Furthermore, innovative talent is an important factor in creating a sustainable organizational competitive advantage [29].

From these relationships, the researcher has set the ninth hypothesis, as follows:

H9: *Innovative capacity has a positive relationship with business performance.*

5. Research Method

5.1. Questionnaire Development

A literature review related to innovative capacity and business performance found that there were five important factors. These were leadership orientation, entrepreneurial orientation, networking capacity, innovative capacity, and business performance. Each factor has crucial indicators, as follows:

- Leadership orientation (LE)
 - Personal skills of the business leaders (LEP)
 - Social capacity of the leaders (LES)
- Entrepreneurial orientation (EN)
 - Creativity (ENC)
 - Proactive performance (ENA)
 - Competitive capacity (ENO)
 - Capacity to confront risk (ENR)
- Business networking capacity (NE)
 - Organizational structure (NEO)
 - Knowledge exchange (NEK)
 - Networking support (NES)
- Business innovative capacity (IN)
 - Process innovation (INR)
 - Product innovation (INP)
 - Market innovation (INM)
- Business performance (SU)
 - Financial perspective (SUF)

- Internal process (SUR)
- Employee perspective (SUP)
- Customer perspective (SUC)

The literature review found relationships that can be constructed as a research framework, as shown in Figure 1.

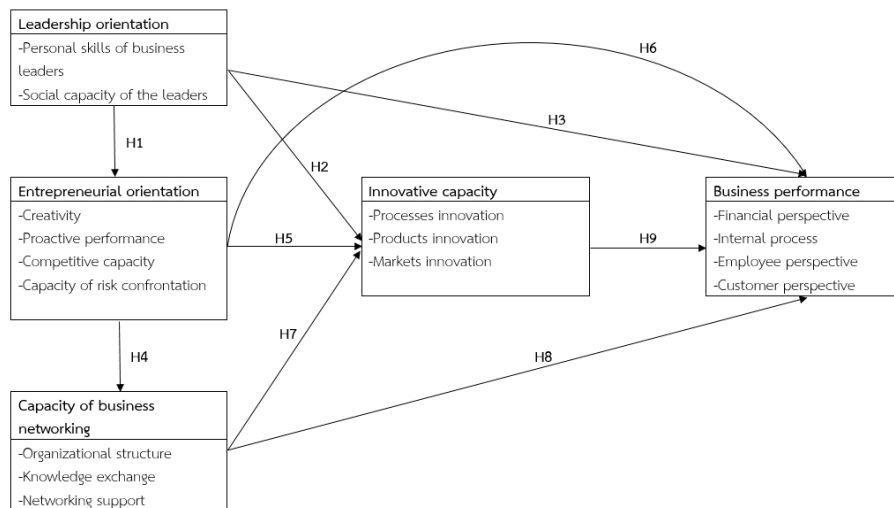


Figure 1. Research framework.

5.2. Research Hypothesis

The research framework can be written as the following research hypotheses.

- H1:** Leadership orientation has a positive relationship with entrepreneurial orientation.
- H2:** Leadership orientation has a positive relationship with innovative capacity.
- H3:** Leadership orientation has a positive relationship with business performance.
- H4:** Entrepreneurial orientation has a positive relationship with networking capacity.
- H5:** Entrepreneurial orientation has a positive relationship with innovative capacity.
- H6:** Entrepreneurial orientation has a positive relationship with business performance.
- H7:** Networking capacity has a positive relationship with innovative capacity.
- H8:** Networking capacity has a positive relationship with business performance.
- H9:** Innovative capacity has a positive relationship with business performance.

5.3. Sample Group

This study used universities in Thailand as its sample group. The researchers used the list of university incubators in Thailand, found on the website of the Office of the Higher Education Commission. At present, there are 56 incubator centers in total, divided into 9 network groups, including upper-north networks (5 centers), lower-north networks (4 centers), upper-central networks (13 centers), central networks (10 centers), lower-central networks (10 centers), upper-northeast networks (5 centers), lower-northeast networks (8 centers), east networks (2 centers), upper-south networks (4 centers), and lower-south networks (5 centers). Next, the researchers coordinated with the incubators in each center to examine the list of names of all incubated entrepreneurs from all incubators. In total, more than 500 incubated businesses have had successful performances.

The sample group used in this study was the group of businesses incubated by incubator units of universities in Thailand, which were in the startup companies and spinoff companies group. According to the structural equation modeling (SEM) analysis, there was no determination for a certain sample size. The sample units used for the study could not be less than 200 samples [69]. To consider the observable variables in the model, the variables had to be in a proportion equal to 5–10:1 [70]. For example, if the research had 15 observable variables, then the number of suitable samples should include 75–150 samples. For this study, there were 61 observable variables in total. Therefore, the number of collected samples should be at least 200 samples, up to 10 times the number of observable variables, which would be 610 samples. The study used the minimum criteria from Kline [69] to determine the sample size; therefore, it was determined to be equal to 220 samples, and the sample group was selected using the purposive sampling method.

6. Research Results

This study used questionnaires as its instrument for collecting data on the innovative performance of businesses incubated by the incubator units of universities in Thailand. The details in the questionnaire consisted of primary information about the interviewee, information about the business, and their opinions with respect to all five factors. When the research was finished, the data was statistically analyzed to study innovative performance.

Before the statistical analysis, the researcher ran statistical tests to check the normal distribution of the collected responses. The normal distribution was evaluated using two indicators, skewness value and kurtosis value. Stuart and Ord [71] stated that the skewness value should be between –3 and +3 in order to determine that a distribution was normal. Decarlo [72] specified that kurtosis should be between –3 and +3 in order to determine that a distribution was normal. The data analysis found that the skewness value was between –1.183 and 0.589, and the kurtosis value was between –1.302 and 2.196. Thus, it was concluded that the data from the questionnaires had a normal distribution.

The researcher used the SPSS program to calculate the values of the correlation coefficients among the variables. Table 1 below displays the values.

Table 1. Matrix of correlation coefficients among the studied variables.

		Leader	Entrepreneur	Network	Inno	Bsc
Leadership Orientation	Pearson Correlation	1	0.456 **	0.287 **	0.426 **	0.289 **
	Sig. (2-tailed)		0.000	0.000	0.000	0.000
	N	220	220	220	220	220
Entrepreneurial Orientation	Pearson Correlation	0.456 **	1	0.535 **	0.699 **	0.531 **
	Sig. (2-tailed)	0.000		0.000	0.000	0.000
	N	220	220	220	220	220
Business Network Capacity	Pearson Correlation	0.287 **	0.535 **	1	0.473 **	0.634 **
	Sig. (2-tailed)	0.000	0.000		0.000	0.000
	N	220	220	220	220	220
Business Innovation Capacity (Inno)	Pearson Correlation	0.426 **	0.699 **	0.473 **	1	0.582 **
	Sig. (2-tailed)	0.000	0.000	0.000		0.000
	N	220	220	220	220	220
Balanced Scorecard (Bsc)	Pearson Correlation	0.289 **	0.531 **	0.634 **	0.582 **	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	
	N	220	220	220	220	220

** Correlation is significant at the 0.01 level (2-tailed).

Table 1 lists the Pearson correlations; the results revealed that the *p*-value s were significant (at the 0.01 level) for all of the coefficients. This means that entrepreneurial orientation, networking capacity,

innovative capacity, and success of business performance had positive statistical relationships at the 1% level.

Having tested the correlations, the researcher used the SPSS Amos program to calculate the relationship among the factors in the SEM. Table 2 indicates the results when using the test to evaluate the data–model fit.

Table 2. The evaluation of the model fit for the structural equation model.

Evaluating the Data-Model Fit	Criteria	Analysis Result
1) CMIN- <i>p</i> (Chi-square probability level)	<i>p</i> > 0.05	0.715
2) CMIN/df (relative Chi-square)	<3	0.715
3) GFI (goodness of fit index)	>0.90	0.999
4) AGFI (adjusted goodness of fit index)	>0.90	0.980
5) RMSEA (root mean square error of approximation)	<0.08	0.000
6) RMR (root mean square residual)	Nearly 0	0.254
7) CFI (comparative fit index)	>0.90	1.0

SEM was used to discover the relationships among leadership orientation, entrepreneurial orientation, networking capacity, innovative capacity, and business performance. Using the empirical data, Table 3 displays the variances from the regression analysis, according to which the hypothesis test results can be analyzed, as follows:

Table 3. Variance from regression weight analysis.

			Estimate	S.E.	C.R.	P	Standardized Estimate
Entrepreneur	<—	Leader	0.678	0.090	7.574	***	0.456
Network	<—	Entrepreneur	0.702	0.075	9.366	***	0.535
Inno	<—	Entrepreneur	0.555	0.059	9.399	***	0.571
Inno	<—	Leader	0.187	0.077	2.437	***	0.129
Inno	<—	Network	0.097	0.041	2.357	0.018	0.131
Bsc	<—	Network	0.434	0.056	7.819	***	0.445
Bsc	<—	Inno	0.432	0.090	4.813	***	0.328
Bsc	<—	Entrepreneur	0.087	0.093	0.939	0.348	0.068
Bsc	<—	Leader	−0.018	0.103	−0.175	0.861	−0.009

* *p*-value < 0.05, ** *p*-value < 0.01, *** *p*-value < 0.001. ** Correlation is significant at the 0.01 level (2-tailed).

H1: Leadership orientation has a positive relationship with entrepreneurial orientation.

The analysis results revealed that leadership orientation had a positive relationship with entrepreneurial orientation at the 0.001 level of statistical significance, where the standardized estimate was equal to 0.456, the C.R. was equal to 7.574, and the *p*-value was equal to 0.000. Therefore, the research results support hypothesis 1.

H2: Leadership orientation has a positive relationship with innovative capacity.

The analysis results suggested that leadership orientation had a positive relationship with innovative capacity at the 0.001 level of statistical significance, where the standardized estimate was equal to 0.129, the C.R. was equal to 2.437, and the *p*-value was equal to 0.000. Therefore, the research results support hypothesis 2.

H3: *Leadership orientation has a positive relationship with business performance.*

The analysis results found that leadership orientation had no positive relationship with networking capacity, with a 0.05 level of statistical significance, where the standardized estimate was equal to -0.009 , the C.R. was equal to -0.175 , and the p -value was equal to 0.861 . Therefore, the results do not support hypothesis 3.

H4: *Entrepreneurial orientation has a positive relationship with networking capacity.*

The analysis results revealed that entrepreneurial orientation had a positive relationship with networking capacity at the 0.001 level of statistical significance, where the standardized estimate was equal to 0.535 , the C.R. was equal to 9.366 , and the p -value was equal to 0.000 . Therefore, the results support hypothesis 4.

H5: *Entrepreneurial orientation has a positive relationship with innovative capacity.*

The analysis results found that entrepreneurial orientation had a positive relationship with innovative capacity at the 0.001 level of statistical significance, where the standardized estimate was equal to 0.571 , the C.R. was equal to 9.399 , and the p -value was equal to 0.000 . Therefore, the results support hypothesis 5.

H6: *Entrepreneurial orientation has a positive relationship with business performance.*

The analysis results showed that entrepreneurial orientation had no positive relationship with organizational performance, with a 0.05 level of statistical significance, where the standardized estimate was equal to 0.068 , the C.R. was equal to 2.666 , and the p -value was equal to 0.939 . Therefore, the results do not support hypothesis 6.

H7: *Networking capacity has a positive relationship with innovative capacity.*

The analysis results found that networking capacity had a relationship with innovative capacity at the 0.05 level of statistical significance, where the standardized estimate was equal to 0.131 , the C.R. was equal to 2.357 , and the p -value was equal to 0.018 . Therefore, the results support hypothesis 7.

H8: *Networking capacity has a positive relationship with business performance.*

The analysis results revealed that networking capacity had a positive relationship with business performance at the 0.001 level of statistical significance, where the standardized estimate was equal to 0.445 , the C.R. was equal to 7.819 , and the p -value was equal to 0.000 . Therefore, the results support hypothesis 8.

H9: *Innovative capacity had a positive relationship with business performance.*

The analysis results found that innovative capacity had a positive relationship with business performance at the 0.001 level of statistical significance, where the standardized estimate was equal to 0.328 , the C.R. was equal to 4.813 , and the p -value was equal to 0.000 . Therefore, the results support hypothesis 9. Figure 2 (below) shows how the model can be constructed as a developmental model of innovative capacity and business performance.

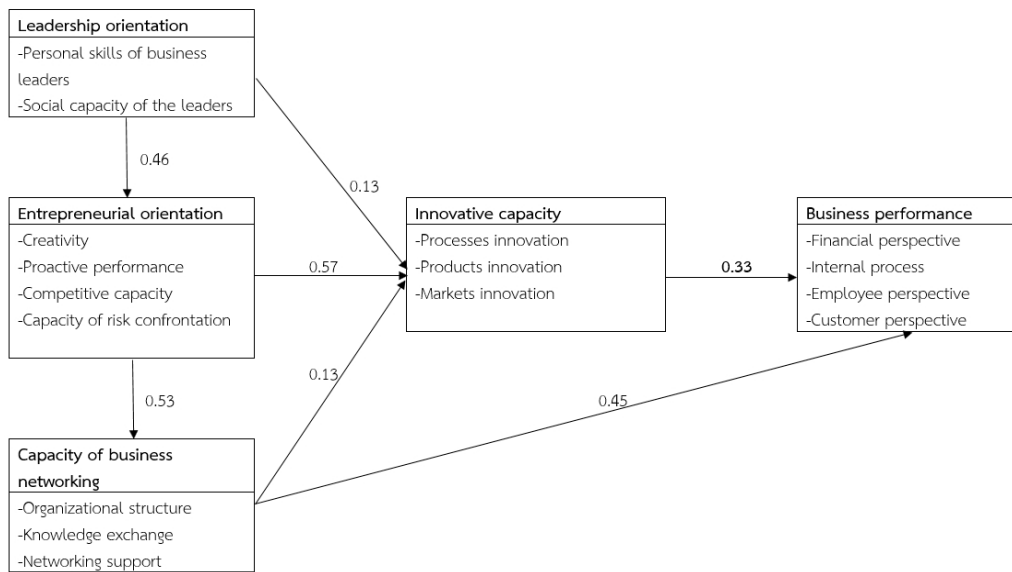


Figure 2. Developmental model of innovative capacity and business performance.

7. Discussion

According to our research, there are five factors—leadership orientation, entrepreneurial orientation, networking capacity, innovative capacity, and business performance—which affect the success of a business. The results revealed that most of the interviewees had many opinions of the components, from the lowest to the highest level. Their opinion of leadership orientation was at the highest level, whereas the levels of other components varied greatly. This result suggests that most of the interviewees emphasized leadership orientation at the highest level. This component consists of the following sub-components: The personal skills of the business leaders and capacity as a leader. Having a high state of leadership helps an organization achieve successful performance more quickly, as its executives drive the major policies of an organization. Therefore, support from top-level executives is regarded as essential, which must be supported throughout the hierarchy, giving better results for the organizational performance success. Other components, including entrepreneurial orientation, networking capacity, and innovative capacity, were regarded as crucial components affecting the performance of a business. This concurs with the theories that were explored before constructing the research model.

The fundamental type of business developed by the business incubator units of universities in Thailand is considered to be small businesses, developed through the use of knowledge from universities, until it becomes successful and is applied as a model for other businesses, or anyone else who wishes to start a new business. The major components to focus on include leadership orientation, entrepreneurial orientation, networking capacity, and innovative capacity; while additional components might also be applied and emphasized, according to the context of different businesses and areas.

A confirmatory factor is the capacity to assess the appropriateness of the research instruments. The researcher had the question items (IOC) of the questionnaire assessed by three experts, and the values of the IOC were at a satisfactory level; more than 0.5 for all items. The researcher collected the data from 220 completed questionnaires. The IBM SPSS Amos program analyzed the confirmatory factor.

The sample group used in this study is the business group, incubated by the incubator units of universities in Thailand. To determine the size of the samples, according to SEM, there was no specific size determination. The sample unit used in this study should not have been less than 200 samples [69], or, if considering the method of observable variables, it should have had a proportion equal to 5–10:1 [70]. For example, if a study has 15 observable variables, the suitable sample size is between 75 and 150 people. This research had 61 observable variables in total. Therefore, the sample

size should have been at least 200 samples, up to 10 times the observable variables; that is, 610 samples. The researcher coordinated with entrepreneurs incubated in the incubator units of universities in Thailand, and 220 questionnaires were returned.

Some researchers have suggested that the number of samples used for analyzing confirmatory factors should be increased to about 10–20 times the number of observable variables [73]. Byrne [74] indicated that a sample size of 500 was the perfect size, but if the sample size was equal to 300 samples, it would still be considered fair; however, 100 samples was not good, and 50 samples was very bad. Given the time limit of the study, only 220 questionnaires were collected. While some researchers consider this number sufficient to meet the recommended valid criteria, some researchers disagree. Hence, to analyze the confirmatory factor completely, additional information may have to be collected, in order to draw conclusions as to the correctness of this part of the research.

The researcher used the SPSS Statistics program to calculate the correlation coefficients for leadership orientation, entrepreneurial orientation, networking capacity, innovative capacity, and business performance success. The results found that the component obtained from the synthesis of previous research had its relationships in the same directions. This is in line with the opinion level of the interviewees, who had opinions on the components from the lowest to the highest levels; this indicated that a new, burgeoning business must be more focused on these factors.

The IBM SPSS Amos program used the path analysis method to test all the nine hypotheses given. The statistical results supported seven of the hypotheses and rejected two of them. In creating perfect models, the literature review clarified that all the components had relationships with each other. Leadership orientation had a direct relationship with entrepreneurial orientation. The weight was equal to 0.46, but there was no direct relationship with innovative capacity and business performance. However, leadership orientation had indirect relationships with networking capacity (with weight $0.46 \times 0.53 = 0.24$), with innovative capacity (with weight $0.46 \times 0.57 = 0.26$), and with business performance (with weight $0.46 \times 0.57 \times 0.33 + 0.46 \times 0.53 \times 0.45 = 0.19$).

Entrepreneurial orientation had a direct relationship with innovative capacity, with a weight equal to 0.57, and it had a direct relationship with networking capacity, with a weight equal to 0.53. It also had an indirect relationship with business performance, with a weight equal to 0.43 ($0.57 \times 0.33 + 0.53 \times 0.45$).

Innovative capacity had a direct relationship with business performance, with a weight equal to 0.33. Networking capacity had a direct relationship with business performance, having a weight equal to 0.45.

8. Research Limitations

The author confronted the following problems while carrying out this study, which became the limitations of this research:

1. The time framework for conducting the study, especially the time for data collection, was limited, such that the researcher could not collect in-depth data from the incubator units or entrepreneurs using other methods, such as interviews. Thus, the data collection was carried out by emphasizing on the electronic questionnaires.

2. The data collection by the electronic questionnaires was initially done by contacting the interviewees through electronic channels. At the first stage, the researcher contacted the subjects by sending emails, along with a request letter asking for questionnaire responses from Walailak University. The interviewees could use their mobile phones or computers to go to the webpage and answer the questionnaire immediately. However, none of them responded and returned the questionnaires.

3. The researcher changed the method of contact with the subject, by calling them and telling them the name of the website where they could answer the questionnaire. However, the questions were too long to answer over the phone; therefore, the researcher used an external service to shorten the website link to only a few letters. Although contact by telephone could allow subjects to answer more questionnaires, the communication took too much time, given all interviews had to be conducted

individually. It is worth noting that the entrepreneurs in businesses related to digital technology, such as computer program services or mobile services, had a higher questionnaire response rate than other groups. This was because some groups of entrepreneurs were not skilled at using electronic systems; therefore, they did not answer the questionnaire.

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