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What Makes Information Strategic ? An Examination Of Access To Information Resources For Entrepreneurs And Business Performance

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WHAT MAKES INFORMATION STRATEGIC?
AN EXAMINATION OF ACCESS TO INFORMATION RESOURCES FOR
ENTREPRENEURS AND BUSINESS PERFORMANCE

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DEDICATION

This dissertation is dedicated to my parents, who offer me unconditional love and support, who encourage me to chase my dreams, who want me to be me. To my future beloved one and children, thank you for letting me get prepared.

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I would like to acknowledge the vast amount of support of my friends and family. Group JJNN and 110120, you and your beloved ones have made this journey full of joy. I could have never made this far without the support from my warmest family members.

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ABSTRACT

The purpose of this study is to explore the nature of the relationship between the access to and use of information resources of entrepreneurs and their business performance. The survival and competence of organizations relies heavily on their recognition of information as important strategic resource. Entrepreneurs, specifically, face a constantly changing environment and are in a disadvantaged competitive position in finance and experience compared with large companies. Access to, and use of information resources, will help them improve their business performance.

This study collects both qualitative and quantitative data, investigating the entrepreneurs' business performance and their behaviour in accessing and using information resources. The qualitative data is applied to explore the technology incubator consultants' understanding of business performance indicators for entrepreneurial businesses. For the quantitative data collection, entrepreneurs are selected from technology incubators in the U. S to participate in a questionnaire survey. Structural Equation Modeling (SEM) is used to process and analyze the data reflecting the business performance, access to information resources, and use of information resources.

A preliminary Access-Performance model and a Use-Performance model are presented. The results indicate that the use of information resources has a positive influence on the performance of entrepreneurial businesses. No strong relationship is revealed between the access to information resources and business performance.

However, there is a high probability that the entrepreneurs have other information resource accesses options than those covered in the original model.

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LIST OF ABBREVIATIONS

CFA.....	Confirmatory Factor Analysis
EFA.....	Exploratory Factor Analysis
ICTs.....	Information and Communication Technologies
NAICS.....	North American Industry Classification System
RMSEA.....	Root Mean Square Error of Approximation
SBA.....	Small Business Administration
SEM	Structural Equation Modeling
SRMSR	Standardized Root Mean Square Residual

CHAPTER 1

INTRODUCTION

1.1 Purpose of Study

The purpose of the present study is to investigate the nature of the relationship between the access to and use of information resources by entrepreneurs and their business performance. This study focuses on entrepreneurs in technology incubators in the U. S. by investigating the information resources that are available to them and their use of those information resources as well as their business performance using a quantitative data collection approach. Information and knowledge have, for a long time, been regarded as valuable resources for strategic management and decision making (Porter, 1998; Choo, 2005). Entrepreneurs face a constantly changing environment and are in a disadvantaged competitive position in finance and experience compared with large companies; access to and use of information resources will help them improve their business performance. In addition, this study expands the issue by exploring the relationship between access to and use of information resources in different industries. Furthermore, it investigates whether access to and use of information resources have positive or negative, financial and non-financial impacts on the companies studied. Using a structural equation model, this study intends to address the complexities of those concepts through the measured variables.

1.2 Background

Entrepreneurs have been frequently linked to economic development and the creation of wealth in the modern society (Lavoie, 2015). In addition, entrepreneurs have played various roles throughout the history of economics (Barreto, 2013), for example: the coordinator of resources, the arbitrageur in a world unbalanced with information, the uncertainty-bearer in the business field, and the innovator of economic development (Schumpeter, 1934). However, the failure rates of these businesses are consistently incredibly high. Only about half of entrepreneurs survive beyond five years (Lueg. et al, 2014). The number is even lower among high-tech oriented companies (Cader and Leatherman, 2011). Therefore, the sustainability of the entrepreneurs becomes a great concern of research on entrepreneurs. The scope of this study goes beyond economic conditions to include a diversity of factors such as industry, location, and various environmental factors (Luo and Mann, 2011). Sustainable development is defined as a way of social and structural economic transformation that optimizes the current available benefit without jeopardizing the potential benefit in the future (Goodland and Ledec, 1987), which, in the case of entrepreneurial businesses, means entrepreneurial entities should make the best use of the available resources and still keep the potential benefit for strategic development in the future. The entrepreneurs leverage a set of resources and produce goods and services valued by consumers to earn a profit. However, this process is not supposed to be a one-time activity. The entrepreneurs need to repeat this cycle or an variation of it to achieve the development of their companies and eventually grow to be stable businesses, which are capable of resolving challenges from outside and within the organization.

Information has become recognized as a strategic resource for business in the “information age” (Davenport and Prusak, 1997, p. 3). The infusion and the wide application of information and knowledge have revolutionized the way organizations operate and conduct business. The survival and competence of these organizations will heavily rely on their recognition of information (Choo, 2005). The purpose of this study is to explore the nature of the relationship between the access and use of information resources of the entrepreneurs and their business performance.

Small businesses and entrepreneurs represent a vital and vigorous power in the U.S. economy and have a significant impact on economic development. In the latest Small Business Administration (SBA) report, small businesses added 1.4 million net new jobs through the first three quarters of 2014; in the first quarter of fiscal year 2015, venture capital investments totaled \$23.4 billion (SBA, 2015). Entrepreneurs not only contribute to economic growth and job creation but also lead in innovation. They are responsible for half of all innovations and 95% of progressive changes in the U.S. (Timmons and Spinelli, 2009). Innovation is the core ingredient of business success. It is the application of a new idea or better solutions that meets existing or unarticulated market needs. Information helps businesses discover existing opportunities as well as potentially offering foresight to emerging trends, and, therefore, to allow businesses to stay ahead of their competition as the environment changes.

The development of small business and entrepreneurs is even more significant in the present economic environment. Economic development is abandoning the traditional approach, which heavily relies on financial and labor capital, and shifting to a new strategy, one which relies on building new businesses and supporting existing businesses

(Edmiston, 2007). Supporting small businesses and entrepreneurs is the key intent of this strategy, for small businesses and entrepreneurs are developing new ideas, creating additional jobs, and producing innovative products and services. Entrepreneurship also plays an indispensable role in the race for global innovation advantage (Atkinson and Ezell, 2012). It is entrepreneurship that takes new products and services into commercial application and tests the market. The market evaluates the utilization of the “idea” and available knowledge and selectively keeps those ideas that can secure innovation advantage. The action of taking a technological idea from concept to commercialization is the only way to realize the economic value of creation and invention. Despite the value that entrepreneurs create as goods and services, continuing evolution and innovation help their organizations maintain a competitive advantage.

Along with the opportunities brought about by innovations, there are also challenges for entrepreneurs. Newness and smallness make the chances of survival and success extraordinarily problematic. Even if they do survive, they may be less financially secure than large companies and their financial rewards smaller during the first couple of years (Timmons and Spinelli, 2009). Historical research shows that only two of every five new small firms survive six or more years, with few achieving any growth during the first four years (Phillips and Kirchhoff, 1988). Studies illustrate that the failure rates among entrepreneurs are very high; even the most optimistic research has indicated failure rates as high as 46.4% (Timmons and Spinelli, 2009). It is not uncommon to find that the business performance of many of these companies failed to meet the entrepreneurs’ expectation (Cassar, 2014; Solaimani and Bouwman, 2012).

Despite their poor survival record, entrepreneurs have a number of qualities that help them survive and achieve their ultimate goal—sustainable development of the business.

1.2 Statement of the problem

Entrepreneurs have realized that sustainable development is necessary for them to achieve economic, social, and environmental goals without compromising their future growth. Therefore, entrepreneurs must constantly prepare for change, including the identification of potential markets and opportunities for organizational learning. Environmental scanning is recognized as a key approach of generating such business insights. Through information acquisition and knowledge transformation, environmental scanning sustains and enhances business performance in a turbulent environment (Choo, 2002).

Innovation is necessary for survival and sustainable development (Timmons and Spinelli, 2009) and is a characteristic that distinguishes entrepreneurial businesses from other small businesses. Developing an entrepreneurial business is a process of recombining the existing knowledge and exploiting new knowledge (Schumpeter, 1934). Successful technical innovation is usually associated with the flow and diffusion of knowledge (Porter and Stern, 2001; Acs et al., 2009; West & Noel, 2009; Sullivan & Marvel, 2011; Lai et al., 2014; Lueg. et al, 2014; Love and roper, 2015). More importantly, the nature of knowledge allows it to be transferred into economic gain by using knowledge to support creation, manufacturing, and business management processes (Zander and Kogut, 1995; Zucker, Darby, and Brewer, 1998; Jensen and Thursby, 2001; Gans and Stern, 2003; Block et al., 2013; Braunerhjelm, 2015;). Entrepreneurship serves

this function very well because it spurs innovation into production and services and bring products to the market in exchange for revenues.

In order to supplement the insufficient financial resources of entrepreneurial businesses and to assist developing the features that will help such businesses to secure a competitive advantage, information and knowledge are desperately needed and are strategic assets in the overall business field (Kenny and Gudergan, 2006; Schiuma, 2012; Dobbin and Baum, 2014). De Geus (2002) points out that “during the past 50 years, the world of business has shifted from one dominated by capital to one dominated by knowledge” (De Geus, 2002, pp.16). As information and knowledge become a central productive and strategic element, organizations are increasingly reliant on their ability to access and use information and knowledge.

Information plays multiple functions in entrepreneurial organizations, which include optimizing creation, keeping the flow of innovative trends, and establishing a learning environment in order to maximize profitability. Understanding relevant regulation and policies also help businesses to locate available financial support, cut costs to explore potential products and services, and add protections on existing assets; for example, filing a patent. Information provides supports to these activities in multiple ways, such as time, cost, and strategic planning. Therefore, accessing and using information is a central management responsibility for entrepreneurs in order to consolidate their achievement and maintain the competitive advantage.

The process of systemically and actively managing the knowledge in an organization is equally important to maintaining competitive advantages. The management of knowledge can be categorized into a number of activities, including

creation, validation, presentation, distribution, and application. It is a process of capitalizing on knowledge, which aims at creating a learning environment to nurture the growth of technology, techniques, and people (Hislop, 2013). Knowledge management is significantly facilitated via the access and the use of information resources. Information resources provide the sources of particular types of data for knowledge creation as well as the approaches, which enable the communication of knowledge.

The phrase, *information resources*, is defined as “the services, the packages, and the support technologies and systems used to generate, store, organize, manipulate, and provide access to these information-bearing entities” (Matthews 2002, p.1). In this study, interpersonal contacts will also be included. Information resources will assist entrepreneurs in investigating the market, locating financial resources, spotting latest technology, and developing efficient networks by providing timing and comprehensive information and knowledge (Davenport and Prusak, 1997). Previous research found that information is an important component for business success (Vaughan, 1999; Klusek and Bornstein, 2006; Wu and Kendall, 2006; James, 2010; Chang and Wang, 2011; Isik et al., 2013). There is also a positive correlation between information use and financial benefits (West & Olsen, 1988; Subramanian et al., 1993; Keh et al., 2007). In addition, the absence and dysfunction of access to information resources have also been identified in recent studies (Banda et al., 2004; Underwood, 2009; Leavitt et al. 2010). The nature of the relationship between information resources and entrepreneurial business performance, however, is not broadly recognized nor has there been much discussion on any specific function of the ways in which information resources support the growth and development

of entrepreneurs. This study seeks to fill that gap by investigating the function of and contribution made by information resources to entrepreneurial business performance.

1.3 Definitions

Before examining the role of the access to and the use of information resources in entrepreneurial business development, it is useful to have a better understanding of what these and other terms mean in this research context. The following section includes definitions of important concepts used in this study.

Entrepreneur

Ahmad and Hoffman (2008) define entrepreneurs as “those persons (business owners) who seek to generate value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets” (Ahmad and Hoffman 2008, pp. 8). The firms they own or manage are founded within a relatively short time but have been helped through the incubation period (Figure 1.1) (Woodward et al, 2011). Incubator, in the entrepreneurial business context, refers to organizations dedicated to help startup and early-stage companies to develop by providing office spaces, business advisory, or technical assistance (Bruneel et al. 2012). This assistance is accessible through counseling activities with the incubator management and networking interactions with other businesses.

Not all business people in private enterprise economies are entrepreneurs. Distinguished from other young firms, the identifying feature of entrepreneurial organizations is that they are doing something new, whether they are inventing new products or installing a new process. The role of the entrepreneur is to innovate (Schumpeter, 1934). In the *Oslo Manual* innovation is defined as “the implementation of

a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations” (OECD, 2005, pp. 49). The newness or significant improvement of the product, process, marketing method, or organizational method to the firm means the firm has to initially develop the product, process, or method, or be the first to adopt from other firms or organizations (OECD, 2005).

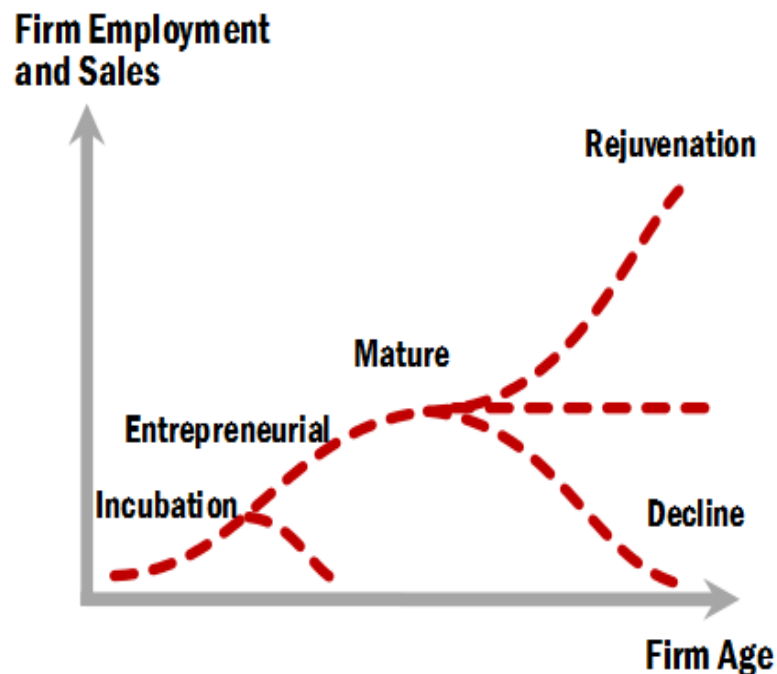


Figure 1.1 Stage of Firm Growth (Woodward et al, 2011)

This study focuses on the entrepreneurs in technology incubators, who operate or manage their own businesses. To capture the opportunity of taking technological concept to commercialization, they need to acquire relevant and applicable information to help them keep a fast pace of innovation. A technology incubator is an infrastructure that provides lab, office, and manufacturing facilities to the newly-formed technology-

intensive firms at a reasonable price until they enter the stable growth stage (Stevenson and Thomas, 2001; Sá and Lee, 2012). Technology incubator staffs provide technology assessment, help write business plans and proposals, and offer entrepreneurial mentoring. Entrepreneurs within the incubators are normally examined and pre-selected according to certain standards. For example, to be qualified to be accepted by the University of South Carolina's technology incubator, a business must "need interaction with the university, be a technology-based company with a business plan, and have growth potential and team-building capability" (Stevenson and Thomas 2001, pp. 11).

Information Resources

Information resources are defined as "the available data, technology, people and processes within an organization to be used by the manager to perform business processes and tasks" (Pearlson and Saunders 2010, pp. 48). Information resources can be assets that a firm uses to create, produce, or distribute its products and services, or capabilities that it learned and developed to forge those activities. As the entrepreneurial businesses are restricted by size and have limited financial support, they also have to seek information resources, which are able to provide business insights at a relatively acceptable price to fulfil their needs. Such resources are scattered in a variety of professions and fields. Therefore, this research redefines information resources within the entrepreneur business context as the available people, institutions, and ICTs-based (Information and Communication Technologies) social networks that can be used by entrepreneurs to perform business processes and tasks.

Interpersonal Connections

Studies show that interpersonal connection is the major channel for entrepreneurs and small business owners to acquire information regardless of their operating environment (Lillard, 2002; Ikoja-Odongo and Ocholla, 2004). Based on previous research, people can serve as information resources. This includes the entrepreneurs themselves (as they often make decisions based on previous experience), friends, family, coworkers, suppliers, customer, consultants/experts/specialists in the industry, faculty and students from the university, and information specialists, such as librarians.

Institutional Platforms

Information institutions are units that facilitate the creation, distribution, and management of information to support the user's needs. The forms and services they provide vary and have greatly expanded over time. Information creation institutions include book publishers, newspapers publishers, magazine and journal publishers, and the film and record industry (Lester, 2003). In previous studies, the film and record industry is hardly mentioned as a useful source of information for entrepreneurs, so it is excluded in this research. Lester (2003) also lists the mass media and Internet based technologies (which are categorized as information technology) as information distribution approaches. The convergence of media and technologies has had tremendous growth since the volume of information has increased the complexity of managing information. Meanwhile, knowledge, whose importance in attaining competitive intelligence and organizational advantage (Semertzaki, 2011), has been realized, and is therefore valued not only as a power, but also as an organizational asset. It is given equally as much attention as information, if not more. Professional and targeted services are in such urgent

demand, and organizations to process information have emerged to fulfill those needs. Libraries, database vendors, educational programs, business consulting units, and information centers, despite the difference in title, have all served this purpose with each one of their specialties.

ICTs-based Social Networks

Information and knowledge in business context are continuously recreated and reconstructed through dynamic and interactive activities, therefore, it is necessary for entrepreneurs to adopt and use a variety of emerging social networking technologies (Burke, 2013). ICT-based social network refers to computer-based systems that support the creation, collection, distribution, and management of information. It includes the hardware (such as computer), software (such as mobile application), as well as the Internet-based platform (such as Twitter).

Use of Information

The use of information involves a process of gathering, organizing, analyzing, and communicating (Taylor, 1991). The result of using information resources is rarely presented in terms of tangible products or services, as the products and services are most often evaluated by the revenue generated or customer satisfaction, which raises questions regarding whether information plays any role in business activity. In consideration of the difficulties in measuring the use of information, usage is measured in various ways including: 1) the time entrepreneurs spend in retrieving information, 2) the money they spend in acquiring the information, 3) the information use behavior of the entrepreneurs, for which there is clear evidence that information is used by individuals and businesses. Choo et al. (2008) introduced new information behavior and value variables, which are

based on Kirk’s (2002) information use outcome model—the result of his information use and culture study. Choo et al. defined the independent variables (Table 1) in this model, and evaluated outcomes of information use in three companies in Canada. In their study, the variables were weighted on information use behavior, not the value or principle for data collection, so the researchers were able to tell if the variables have created any outcomes.

The Choo et al study addresses the question of does the use of information resources of entrepreneurs have effects on their business performance, but the use cannot be directly observed. Choo’s theory provides an approach to explain this behavior by evaluating measurable factors, which include information sharing, information proactiveness, information transparency, information integrity, information informality, and information control. Definitions of these variables are based on Choo et al. (2008).

Table 1. 1 Definition of Independent Variables from Choo et al. (2008)

Variables	Definition
Information sharing	Willingness to provide others with information in an appropriate and collaborative manner
Information proactiveness	Active concern to obtain and apply new information to respond to changes and to promote innovation
Information transparency	Openness in reporting information on errors and failures thus allowing learning from mistakes
Information integrity	Use of information in a trustful and principled manner at the individual and organizational level
Information informality	Willingness to use and trust informal sources over

	institutionalized information
Information control	Information is presented to people to manage and monitor their performance

Business Performance

Business performance manifests the status of business growth and success. The evaluation of business performance includes financial and non-financial indicators and is multidimensional (Venkatramen and Ramanujam, 1986). The investigated companies in this study cover a variety of industries; their approaches to managing their businesses may not be the same, neither are their criteria for evaluating their business performance. Therefore, the research reported here allows entrepreneurs, who have an overall perspective on and in-depth understanding of their company, to rate their own business performance. In case that they do not provide such information, the research design includes another five dimensions as complementary indicators: financial performance, customer performance, internal performance, learning and growth performance, and innovation performance. Each of these dimensions includes a cluster of indicators, selected by the researcher to reflect the entrepreneurial context.

1.4 Objectives of research

The purpose of this study is to examine the relationship between the access to and use of information resources by entrepreneurs and their business performance by addressing the following objectives.

1. To investigate the accessibility of information resources for entrepreneurs in technology incubators.

2. To observe how the entrepreneurs use the information resources.
3. To evaluate the business performance of the entrepreneurs based on given standards.
4. To investigate the relationship between access and use of information resources and business performance.
5. If there is a relationship, identify the key elements.

1.5 Research question and hypotheses

The main research question for this study is “What is the nature of the relationship between access to and use of information resources and business performance for entrepreneurs?” To answer this question, two hypotheses are posed.

Hypothesis 1: There is a relationship between access to information resources and business performance of entrepreneurs in incubators.

Hypothesis 2: There is a relationship between the use of information resources and business performance of entrepreneurs in incubators.

1.6 Significance of the study

As a prominent feature of entrepreneurship, innovation is an important aspect to investigate, as much as their economic contributions. One of the outcomes of this study is a better understanding of the use of information in creating new products, launching new technologies, or introducing new methods in entrepreneurial activities. This outcome will help identify the relevant and valuable information resources for the creation and innovation processes. This kind of knowledge could be useful for both entrepreneurs and information professionals to help reduce the financial and time costs in seeking relevant information. Taylor (1986) suggests looking specifically at the use of information within

the specific environment to help researchers better understand the traits of the user. With a better awareness and understanding of entrepreneurs' use of information resources, information and knowledge institutions can adjust their functions and structure to fulfil the entrepreneurs' needs in an effective and timely manner. It will help these institutions to also know how to market and brand themselves.

1.7 Limitation

The scope of the study is limited to the relationship between the access to and use of information resources and business performance. However, it is very unlikely that all of the effects of information can be isolated from other factors that influence business performance. Therefore, even though there may be a change in the businesses' performance, it could be the result of the action of additional factors. Attempt is made to mitigate this effect through the design of the survey, such that the information relevant issues are repetitively addressed among the questions.

1.8 Structure of the dissertation

Chapter One provides an introduction to the study. It provides the significance of the study and problems associated with entrepreneurs' access to and use of information resources.

Chapter Two presents a comprehensive review of previous studies that have contributed to the characteristics of entrepreneurs, the state of information resources access for the entrepreneurs, and how the use of information resources benefit their business. The elements that constitute business performance are also examined in this section.

Chapter Three presents the methodology that is used in this study. A combination of qualitative and quantitative data collection is adopted. Qualitative data is collected from managing staff in the incubators through interviews. The content of the interviews is analysed to support the creation of the questionnaire survey. The study carries out a survey among the entrepreneurs in technology incubators all over the U.S. The quantitative data is analysed using a structural equation model in R.

Chapter Four presents the results of the data analysis. The process of model testing is described and explained.

Chapter Five includes a discussion and conclusion section. The discussion focuses on the results from chapter four. The researcher also addresses the research questions based on the results of the data analysis and the discussion. Limitations and biases of this study are reviewed as well.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The goal of this review of literature is to describe the existing studies related to the topic of information and entrepreneurial business. The review places an emphasis on the function of information, focusing on how the entrepreneurs' needs, access, and use of information resources are articulated in the previous research within the library and information science field. This will include a report of findings on entrepreneurs' characteristics, entrepreneurs' access to information resources, and how the use of information resources benefits the entrepreneurs. Theoretical approaches will be explored to explain the research question in this study.

Cross-database retrieval was done to identify potentially relevant research. The author searched the online resources available at the University of South Carolina by subject. The topics of research are limited to the fields of Library Science, Business, and Entrepreneurship, and the search was limited to academic work only. Selected databases include *Library, Information Science and Technology Abstracts with Full Text*, *Library Literature & Information Science Full Text*, *Dissertations and Theses*, *ERIC*, *EBSCO*, and *ScienceDirect*. In the first round, the author used the key words “entrepreneur/entrepreneurship” and “information” for searching, but there were rarely any qualified returns. As entrepreneurial and small businesses share a lot of similarity in their operating models, the author expanded the searching results by using the key words

“small business/enterprise/SMEs” and “information.” As locating and collecting this literature was difficult at best, the author decided to examine the literature listed in the reference section of the returned articles as well.

The first part of this chapter examines the existing studies focusing on the characteristics of entrepreneurial businesses and the role that they play in economic development, the information access available to entrepreneurial and small businesses, and the role that information plays in business development within the entrepreneurial and small business context. The second part provides the theoretical framework for current study based on the review.

2.2 Entrepreneur and Small Business

2.2.1 The characteristics of Entrepreneurs and small business

Small and entrepreneurial businesses represent a vital and vigorous power in the sustainable development of the present economy (Corp, 2005) because they tend to have a higher tolerance of uncertainty and are more willing to take risks (Begley and Boyd, 1987; Covin & Slevin, 1991; Lumpkin & Dess, 1996; Lillard, 2002; Kan & Tsai, 2006; Caliendo, 2009), normally in a proactive manner or by taking a radical approach. They are both challenged and attracted by rapid change (Goldstein and Rodriguez, 2012).

However, Wagener et al. (2010) found that entrepreneurs displayed a higher level of independence and a higher ambiguity tolerance than small business owners.

Entrepreneurs are more likely to be consistent in innovation, generating profit, and growing a business, while the small business owners are more attuned to keeping a stable status quo.

Risk-taking and high tolerance for ambiguity are identified as two of the major traits that differentiate entrepreneurs from non-entrepreneurs. In the context of entrepreneurial activities, risk refers to unpredictability or possible variability of performance below expectation. It is often seen as a chance taken in return for the opportunity of success (Ranch & Frese, 2000; Simon et al., 2000). However, entrepreneurs are only willing to take the risk in their decision making to a moderate level (Thomas & Mueller, 2000). Compared to risk propensity, tolerance for ambiguity is an even more obvious predictor of the entrepreneurial business. Due to the flexible structure of the business model and the restrictions in both funding and experience, entrepreneurs have to deal with insufficient data and have to make decisions within a situation with which they are not familiar. This creates a tendency for the entrepreneurs to have a high tolerance for ambiguity and also be willing to bear the associated uncertainty (Entrialgo et al., 2000; McMullen & Shepherd, 2006; Phillis & Readon, 2007).

It is typical to assume that people engage in entrepreneurship because they anticipate profits; the impact of entrepreneurs on the economy comes from their vision of creating new products and launching new processes. They do not only discover existing opportunities but also create them by taking advantage of technological changes (Schumpeter, 1943). This innovation feature helps entrepreneurs stand out from other business owners. Entrepreneurs exploit the venture opportunity by the establishment of new firms, in which entrepreneurs as individuals are embedded in organizations (Schumpeter, 1942; Van de Ven, 2005; Kamhawi, 2010). Schumpeter (1934) claims that entrepreneurship involves an innovative process, which involves replacement of the old

model with the new model by identifying opportunities that others cannot see and by developing technologies and concepts that enlighten and support new economic activities. Beyond the realm of economic development, entrepreneurship also acts as an element that disrupts traditional organizational patterns and inspires a new organizational structure. Calvo and Garcia (2010) redefine how the characteristics of businesses impact the entrepreneurs' success, which include financial resources, number of partners, frequency and breadth of external communication, and business environment. They conclude that each of these variable, as well as the entrepreneurs' personal traits, have a positive impact on the success of a business. It is believed that entrepreneurship will give rise to a new organizational configuration (Fayolle, 2007). Such entrepreneurial organizations have the willingness to innovate in order to exploit new market opportunities (Wiklund and Shepherd, 2005). Therefore, new knowledge as a basis for generating innovative concepts is in great demand (Covin & Slevin, 1991; Kohli, Jaworski, & Kumar, 1993). Lillard (2002) conducted research involving 41 entrepreneurs on the eBay website. Their research found that among the 31 participants responding to a query regarding their attitudes toward innovation, 22 indicated a positive attitude, 9 show moderate attitudes, while none had a negative response. In addition, a study of 118 entrepreneurs reveals that those who planned for development are more likely to survive than those who do not (Miller et al. 1991, pp. 31).

Because of constant changes in market opportunity, successful entrepreneurial businesses usually involve more human assets than just the entrepreneur. This situation requires entrepreneurs from multiple industries to collaborate and to seek ways to launch new products and markets. Entrepreneurs must possess the critical abilities of assessing

and measuring the impact associated with a project and be able to communicate it with investors. Their background of education, experience, and internal locus of control and resilience is also linked with their business success (Calvo and Garcia, 2010). This creates demands for information resources that support the scanning and evaluating of the operating environment, as well as the capability to process the information and knowledge (Ngui et al. 2008). The information that entrepreneurs acquire is scattered in a variety of fields. In a study carried out by Shoham et al. (2006), the top three information concerns of entrepreneurs are: 1) getting training and gaining new skills, 2) marketing of products, and 3) inputs about sources or supplies and their prices. Other concerns include information on loans, product pricing, and record keeping for tools and equipment, maintenance, etc. Entrepreneurs also rely on information to exploit a competitive advantage and to make strategic decisions. Entrepreneurs actively expose themselves to as many and as diverse information resources as possible, and are found to seek more information than other executives on average (Kaish and Gilad, 1991).

Because of the extraordinary diversity of small businesses in the forms of the nature of products and services, size, age, organizational structure, and individual characteristics of the business owner, the information needs of small business managers are more complex and ill-defined (Bouthillier, 2003). Therefore, a new model of library /information service needs to be designed to meet their context-related information needs.

2.2.2 The role of Entrepreneurs and small business in economic development

The roles of entrepreneurs are variable within different industries, and their impacts depend on the level of economic development (Van Stel, Carree and Thurik 2005). The effects of their actions on economic growth may be generally considered from

the following three perspectives: 1) the capacity to perceive profit opportunities; 2) the risk and uncertainty of the entrepreneurial act: the introduction of a new product or service, or the launching of a new company; and 3) the role of innovation (Carree and Thurik 2005, Landstrom 2005). The capacity to perceive profit opportunities refers to the ability of entrepreneurs to detect a new market for a new product or service and be alert in making use of those opportunities (Kirzner, 1978). This is always accomplished by seeking out an imbalance in the marketing system. Meanwhile, in the detecting and use of profit opportunities, entrepreneurs also have to bear the risks of business failure or very low payment/return in initial steps. Because of the newness of the business, there is considerable uncertainty about how the business develops. However, newness is also used by entrepreneurs as a weapon in their market-making process. The introduction of a new product or service accelerates the destruction of the old product or service and the formation of new markets and organization. Starting from conceiving a new idea, inventing a new device, then to developing a new market, innovation integrates these three processes in a progressive fashion (Myers and Marquis, 1969). Other than those, the entrepreneurial activity is the key process involved in transferring knowledge to the commercial arena (Braunerhjelm et al., 2010). The entrepreneurial activity encourages the production and diffusion of new knowledge, raises the competitive advantage, and increases the diversity of companies (Audretsch and Thurik, 2004). Therefore, entrepreneurs are often characterized as opportunity-spotters and risk-takers, who spur innovation in the creation of new production and services.

Entrepreneurs also play an important role in generating a powerful vector of structural change in overall enterprises and organizations. Besides entrepreneurs, a new

framework is also introduced for larger companies. Entrepreneurs understand and apply the principles that enable them to implement their innovations to achieve business success; therefore, experimental approaches are broadly adopted by entrepreneurs (Fayolle, 2007). Based on trial and error and market feedback, they steer the business toward fulfilling market demands and direct the business to new lines of business. Drastic changes and radical evolution continuously manifest themselves within organizations, which challenge the individual ability of entrepreneurs as well as the structure, operation, and everything else in the organization. Market sensitivity, quick reaction, flat structure, and flexibility assist the organization in seeking business opportunities and in dodging risks when entering new or unfamiliar markets (Morris, 1998). Large companies with relatively abundant resources endeavor to improve products and processes by introducing an innovation, or even more aggressively, by purchasing startups (Senge and Carse, 2010). In bringing in incremental technical innovations, those companies make efforts to be better adapted to the evolution and emerging characteristics of societies (Kenney, 2001). The learning ability and organizational structure of the entrepreneurs enable them to be flexible and quickly react to the everyday changes. It is believed that the organization of enterprises will depend heavily on the development and deployment of intellectual resources rather than the physical assets (Quinn, 1992). The flat but vigorous organizational structure offers large companies an alternative approach to management structure to accommodate the current critical economic environment. The flat structure also helps the organization establish a system in which strategic planning can be based on simultaneous response from the market and therefore, ultimately benefit the development of the organization in the long run.

The multiple positive effects on the national economy may mislead us to draw an over-optimistic conclusion that entrepreneurs are an undefeatable power and will certainly end up successfully and with excellent business performance. On the contrary, due to their smaller size and lack of funding and resources, entrepreneurs, like small business owners, are much more vulnerable than large size companies, and face even more issues than the small business in sustainability. Financial supply, market acceptance, technological innovation, and personal connections are concerns that entrepreneurs must address more than larger businesses.

One of the major challenges faced by small businesses is to find and secure financing, which is also the main cause of the failure of startups. Owner investment and bank credit are the two resources that small businesses heavily rely on (Robb et al. 2010). Thus, locating funding or knowledge about the availability of capital greatly affects the survival of the business. Another disadvantage that may stop small businesses from competing with large companies is a lack of managerial and workforce experience, which limits the growth of the firm and access to financial resources (Gamble et al. 2013).

New business founders often struggle to find a balance between what they initially bring to the table and what the market requires. They rush into the field before getting a clear view of it. Inadequate understandings of market demand may result in over-optimism for a new product or service, and mislead the businesses to develop unrealistic plans and strategies. The impact of poor judgment and decision making increases the likelihood of the founders running out of time, money, and support. It can also drain their personal connections before they ever have a chance to test their idea (Holton and Naquin, 2005).

Observations made about successful entrepreneurs suggest that they share certain common attitudes and behaviors. Aside from strong internal motivation and a unique tolerance for uncertainty and risks (Timmons and Spinelli, 2009), the passion for creation and innovation pushes them towards emerging markets. This entrepreneurial set of attitudes, together with talent and skills, keeps entrepreneurs as the most active force in the U. S. economy. A successful entrepreneurial business requires a combination of a creative and innovative mind, sharp eyes to spot business opportunities, solid management skills, and strong interpersonal networking. Information resources fulfill the requirement as devices for doing environmental scanning and prepare the entrepreneurial and small businesses for their future development. Previous research reveals the urgent need for backing up entrepreneurial and small business development with information resources.

2.3 What entrepreneurs know about information resources

Information has been long valued as a strategic resource in business (Davenport and Prusak, 1997, p. 3). It has functioned as a support not only for operation resource (Negroponte, 1995), but also by presenting a new organizational model. The new organization is featured as “being informed” and “knowing” of both the internal and external environment, and therefore is allowed to maneuver with intelligence, creativity, and skills to develop a quick reaction from a strategic perspective (Choo, 2006). Studies indicate that the importance of information as a central resource is even more important for new ventures (Strum, 2005). This study seeks to explore what role information plays as a resource in the development of entrepreneurial business.

The information resources available to entrepreneurs are in multiple forms. Their accessibility and ranking in preferences to the entrepreneurs have been observed in many different contexts. However, the review also shows that some of the entrepreneurs failed to find the information resources they needed.

A number of studies mentioned that entrepreneurial and small businesses mainly use information resources based on human contact (Hills et al., 1997; Lillard, 2002; Bouthillier, 2003; Ikoja-Odongo and Ocholla, 2004; Sullivan, 2000; Kassim, 2010; Njoroge, 2011, Robinson et al., 2011). In research combining interview and focus group data collection from eBay entrepreneurs, up to 33% of the participants chose interpersonal resources for problem solution, including “family, friends or co-workers,” “other eBaysians,” “previous experience” and “specialist”, followed by other resources such as “trial and error,” “eBay website or technical support,” “Books, magazines and other print materials,” and “Internet provider technical support.”

In a study focusing on the informal sector entrepreneurs, Ikoja-Odongo and Ocholla (2004) found from over 2000 response that entrepreneurs prefer interpersonal approaches when acquiring information. Fifty-nine (59%) of the respondents choose listening and talking to people and contacting those who knew, followed by 55% rely on personal experience, 49% are willing to asking a friend/relative/working neighbor, and 33% like to talk to customer in order.

Shoham (2006) points out in a study conducted among Israeli entrepreneurs that even when entrepreneurs are exposed to numerous information resources, interpersonal communication still stays high as an option. Access to the advice of other entrepreneurs is desired by the newly started entrepreneurs to set up a model for planning. Research

(Kassim 2010) also indicates that potential entrepreneurs prefer to talk to those who have started a business before making the final decision. In research aiming to explore the particular information needs of public libraries in Quebec, Bouthilier (2003) interviewed representatives from eleven small businesses in the sectors of aerospace, information technology, and biopharmaceuticals. Her preliminary results showed that small business managers approach multiple information sources, which include human contact sources, such as customers, suppliers, and consultants, are regarded as the most important, followed by the Internet as the principal source, then print sources, association, electronic databases, and libraries. Similarly, in a questionnaire survey carried out in 525 small companies in seven counties in New Jersey, Ren (1999) found that participants feel more self-effective using interpersonal access in search of government information. However, in terms of the usage frequency of access for government information, “Government print publications” ranks at the top, followed in order by “Friends and trade associates,” “Attorneys and accountants,” and “Commercial information specialists”.

The preferences for information sources within a social network are also different depending on the size of the business. Robinson et al. (2011) examines the social networks of European entrepreneurs, whose businesses have survived after approximately three years. The research categorizes the information sources as informal sources, for example, family and friends, and professional acquaintances, and formal sources, such as professional consultants, training courses, unemployment offices, and financial institutions. The participants are split into three groups according to the employment size of the business (0 employees, 1-9 employees, and 10 or more employees). The results show that all three groups prefer informal sources over formal sources, but their

preferences of informal sources differ based on the size of firm. Businesses with 10 or more employees are more likely to use professional acquaintances, and are less likely to receive advice from family and friends, while businesses with 1-9 employees are more likely to use their family and friends.

Professional advisory sectors and educational institutions, such as consultancy services, universities, and research centers, also play key roles in business success (Chen, 2009; Ganter and Hecker, 2012; Mas-Tur et al., 2015). These services act as external knowledge resources, which help create and transfer knowledge, and incorporate knowledge into the production and management process.

Closely related to human contact, faculty members and university students have also been regarded as a medium by small business owners to get in touch with information resources (Solomon, 1975; Sonfield, 1981; Kumcu and Kumcu, 1998; Mckeown, 2010; Phillips, 2010; Vick et al., 2015). It appears that appropriate library resources and consulting services from faculty are highly valued by entrepreneurial businesses. In terms of relevant literature, primary sources and secondary sources are both recommended to the students. In a study of student consultants' resource use, Philips found that in order to fulfill the needs of business clients, primary resources such as interviews, surveys, and focus group studies, are heavily used in the consulting projects; secondary resources, including both authoritative and nonauthoritative, are also used. These resources are typically available through government, business association and libraries. Kumcu and Kumcu's (1998) research notes that incorporating resources is mentioned as specialized resources for the students in small business consulting.

In many studies, information resources are presented to the entrepreneurs as a “toolkit” (Ikoja-Odongo and Ocholla, 2004; Underwood, 2009; Womack, 2009; Pike et al., 2010; Okello-Obura and Matovu, 2011), which is mostly provided by professional information service and education programs, like libraries, database vendors, or business consulting units, to support information guidance for the target users. It should be noted that most of the “toolkits” are functioning within a library arena. Underwood (2009) elaborates on the Little Business Corner (LBC) in the library as a one-stop businesses information resource for the entrepreneurs looking for help and advice in South Africa. The goal of the LBC is to help build new businesses to strengthen and develop existing business, and to create more businesses owned by the local black people. Multiplicity of sources and services has been developed and offered to the business sectors. The categories of service have been identified to cover but are not limited to the legislation, regulation, prescribed procedures at both national and provincial levels, information about financial support and business-service suppliers, educational programs, and relevant publications and comparative studies. Advanced information vendors like ProQuest expanded services to cover entrepreneurs as users. The content that they provide includes academic journals, books, case studies, learning processes, and market and company research in a variety of media, including videos and blogs. The video collections provide more than 9,000 clips, and along with the blogs, represent a wide range of topics, speakers, and situations (Esler et al., 2011). Mckeown (2010) also found that, in libraries providing services to entrepreneurs, librarians are also regarded as part of the asset. They are not only being called upon to advice on resources but are also involved in navigating the steps of entrepreneurs during the initial period. Besides

providing computing resources and business information resources, the toolkit also functions as a training site, which can be reached by staff associated with commerce and industrial development authorities as well as the public (Pike et al. 2010). Apart from information access within the library context, a business information portal is also created to supply the small business owners with overall services. In Strum's (2005) study of the information needs of the minority small business owners, the online community of Norfolk, Virginia, was found to be valuable in supporting exchanging ideas, mutual learning, and providing information services and tools.

Libraries, attempting to adjust their marketing strategy to extend their services and prove their significance, have been frequently studied as important information resources for entrepreneurs and small businesses (Ren, 2001; Bouthillier, 2003; Fitzgerald et al., 2010; Pankl, 2010; Collins, 2012). From qualitative data collection among small businesses in Quebec, Canada, Bouthillier (2003) found that libraries are highly valued by users for customer service, including personnel competencies, quick turnaround, guarantee of confidentiality, and access to facilities and an information specialist. Pankl (2010), from the perspective of a library service practitioner, emphasized that collection and information services are essential resources in small business development. However, librarians, who specialize in using tools and searching strategies, are equally, if not more, valuable resources in supporting business development. This conclusion is also supported by research done by other scholars. MaRS Discovery District was created to accelerate Canada's performance under the climate of the global knowledge economy and aims to promote science, business, and finance communities. In 2005, MaRS and University of Toronto Library (UTL) built a partnership, which allows

MaRS clients to enjoy timely information services and targeted market intelligence.

Librarians from UTL work closely with business advisors in MaRS to provide information to support the client in improving financial status, market strategies and business plans.

Resources supported by the information and communication technologies (ICT) have joined other resources as a broad repository of valuable information. Studies conducted on ICT based information resources (Neely, 2003; Shoham et al., 2006, Gagliardi, 2010; James, 2010; Jiyane and Mostert, 2010; Leavitt et al., 2010; Njoroge et al, 2011; Alderete, 2014) found entrepreneurs are increasingly fond of utilizing such resources. The implications of ICT-based resources vary in different studies, but mainly point to the computer and Internet (James, 2000; Shoham et al, 2006) as promoting the diffusion of government policy, regulations, education trainings, and funding relations or supplying a platform for entrepreneurs to exchange information. Other technologies, including telephone, mobile phones, and fax are also covered, but they serve more like communication channels than repositories of information. However, in Jiyane and Mostert's (2010) study that focused on rural women entrepreneurs, they found that the majority of the participants possessed ICTs such as mobile phones, landlines, radio and television rather than computer technology. They noticed that among the women participating in the survey, none of them used ICTs to search for business information. A study focusing on an economic development gardening project carried out in Michigan to promote entrepreneur development shows that public and proprietary sources, such as government websites as well as the association websites and industry online directories, are the major source to satisfy the business questions, though the research did show that

primary data from interviews of industry experts and insiders are of the best value (Leavitt et al. 2010).

Close analysis is given to the absence of access as well. The difficulty of accessing information resources for entrepreneurs and small business owners is caused by three major factors. First, the entrepreneurs are often frustrated because of the inadequacy of the resources and supporting technologies. The professional services and ICT based resources mentioned above are not available for all entrepreneurs at all times. The Kenya tourism-related entrepreneurs interviewed expressed their feelings as being isolated, because there is no business network existing to help them survive in a critical economic climate (Njoroge, 2011). It is sometimes vital to the entrepreneurs to talk to people in the industry. However, the networking as well as specialized material, such as market research and up-to-date comprehensive databases are not available in most of the cases for competitor and customer analysis (Leavitt et al. 2010). The second factor concerns the individuals' inability to get the information. For example, one study indicates that entrepreneurs reaching a certain age are more likely to encounter problems using ICT based information resources than those who are younger (Njoroge, 2011). Language, too, is also raised as a barrier for using information resources (Underwood, 2009). The third factor is associated with the failure to organize the available services and facilities for the users to get easy access and retrieval. A questionnaire survey carried out in Chisokone Market in Zambia reflects that the lack of access to information has been cited as a major problem for the local small businesses. The seriously scattered state of information services hampered the smooth organization and dissemination of information (Banda et al., 2004).

The content of information resources is largely diverse from one form to another. There are three major categories discovered in the existing literature, including human-contact based information resources, information resources provided by professional information institutions or units, and ICT-based information resources. They are not isolated or excluded from each other; on contrary, there are some overlaps. However, the existence of information resources does not mean the availability of them nor does it confirm the access to all entrepreneurs in all contexts. Access to information resources is highly restricted by the actual environment and individual ability of the entrepreneurs.

2.4 How entrepreneurs benefit from information resources

Research that focuses on the effects of information resources on entrepreneur's performance is surprisingly rare. The primary functions of information resources, as the studies reviewed above imply, are to supporting the strategic planning of the entrepreneurial business and secure the sustainable development of the organization.

This evidence shows that information resources are used to help entrepreneurs understand the business environment so that they can reposition the operation and adjust the marketing effort accordingly (Dess, Lumpkin and Covin, 1997; Bouthillier, 2003). Researchers (Covin and Slevin, 1991) have found a positive relationship between sticking to an entrepreneurial orientation and performance in a variety of industry settings. Although information resources have an indispensable role in supporting the entrepreneurial features of the organization, the relationship between information resources and performance is not specified. Bouthillier's (2003) study also suggests that small business managers perform environmental scanning primarily through the Internet.

The utilization of information resources helps entrepreneurs move through every step from start to finish. (Neely, 2003; Shokane, 2003) Education, training, and counsel enable the entrepreneurs to transfer their ideas to final products. In the initial growing period, the entrepreneurs are supplied with marketing plans and tools, approaches to funding opportunities, and managerial skills from various sources. Advisory organizations encompass a wide variety of professions, providing services ranging from advertising to legal consultation (Mas-Verdu et al, 2011). Findings indicate that ICT based information resources enhance the efficiency and reliability of information use. As an E-commerce supporting tool, ICTs have revealed their influence in cutting down business running costs, capturing markets, and reaching new customers (Njoroge et al, 2011; Mbatha, 2013).

Although there are not very many studies conducted on the information field that explore the benefits brought to entrepreneurs by information resources, the available evidence shows a positive and optimistic attitude towards the use of information resources. However, since the review is based on a limited number of studies, it is not possible to conclude that a positive relationship exists between using information resources and entrepreneur performance.

2.5 What does business performance mean to entrepreneurs

Business performance reflects the status of a business. Effective strategic planning and successful solution of management problems can be reached by properly assessing the indicators of business performance. The evaluation of business performance includes financial and non-financial indicators; each classification covers a number of specific measures. The selection of the indicators to compose an evaluation system varies

from industry to industry, context to context (Inta Kotane and Kuzmina-Merlino, 2012). Financial performance measures are widely used for two reasons: first, financial performance measures are purely financial, which clearly define and articulate the organization's goals; second, those measures selected, properly based on unique situations, present an aggregate view of performance (Kaplan and Atkinson, 1998). Also, because of the prominent innovation-oriented essence of entrepreneurs, measures that manifest performance in creation and innovation should also be included.

Business performance is evaluated based on the extent to which the entrepreneurs have fulfilled their business plan. The entrepreneurs examined in this study are not limited within one industry, and each industry has an individual key performance indicator to compose an evaluation system. It is very difficult to reach a consensus in how to pick these measures. Kaplan and Norton (2008) created a balanced scorecard (BSC), which is widely adopted to evaluate business performance. Inta Kotane and Kuzmina-Merlino (2012) further analyse the financial indicators included within the BSC system and studies, which suggest other assessments of the indicators. They conclude that an effective business performance system should integrate both financial and non-financial indicators. This finding corresponds to the approaches taken by Venkatramen and Ramanujam (1986) that the measurement of business performance is multidimensional. Their study suggests that business performance is a combination of both financial and operational performance, which exists within the domain of organization effectiveness. Cohen et al. (2008) further show that financial performance is determined under the influence of non-financial performance; non-financial indicators have a positive influence on financial indicators. Therefore, this study accommodates the conceptual framework of

the BSC and multidimensional theory as complementary indicators to the self-evaluation of business performance. There are five dimensions of indicators to be observed: financial performance, customer performance, internal performance, learning and growth performance, and innovation performance. Each includes a cluster of indicators selected with a consideration of the entrepreneurial context. The indicators measuring creation and innovation are manifested by the number of new products and the numbers of patents.

2.6 Summary

All the reviewed studies partially observe the entrepreneurs' pattern in access and use of information resources. However, the number of available studies focusing on the connection between information resources and business performance is very limited. Few studies suggested how the entrepreneurs take the information resources as a powerful tool to gain advantage in competing with their larger peers to achieve their expectations in terms of business performance. Therefore the purpose of this study is to explore the nature of the relationship between access to and use of information resources of entrepreneurs and their business performance. In order to answer the question, two hypotheses need to be tested:

Hypothesis 1: There is a relationship between the access to information resources and business performance.

Hypothesis 2: There is a relationship between the use of information resources and business performance.

CHAPTER 3

METHODOLOGY

3.1 Conceptual framework

The purpose of this study is to investigate the nature of the relationship between the access to and use of information resources of entrepreneurs in technology incubators and their business performance. A cross-sectional design is adopted where data is collected from entrepreneurs in technology incubators across the U. S.

In terms of business performance, this study proposes two indicators: performance evaluation from entrepreneurial business owners and complementary performance indicators. The assessment of productivity, profitability, and market evaluation are more traditional measures of business performance (Firer and Williams, 2003). Performance evaluation is taken as the major indicator because the entrepreneurs are the ones with the closest contact to the operation and development of their companies. In addition, this study also tried to examine indicators in five other dimensions: financial performance, customer performance, internal performance, learning and growth performance, and innovation performance. In this study, financial performance is defined as the operating performance of the business in enterprise. Customer performance is used to evaluate the quality of the relationship between the business and the customer. The internal performance refers to the job performance of employees in the entrepreneurial companies in achieving the companies' goals. Learning and growth performance stresses the readiness of the business to meet the challenges it faces by leveraging organizational

and human assets (Epstein and Wisner, 2001). Considering the entrepreneurs' characteristics, innovation matters a great deal to the survival and development of the business (Chen et al., 2012); therefore, this study observes the innovation performance in addition to the indicators above as well.

Access to information resources is measured with respect to different categories of information resources. Based on the literature review, the three main categories are defined as: 1) interpersonal connections, 2) institutional platforms, and 3) ICT-based social networks. Each category is evaluated by collecting data related to access to specific resources, which are included in this category.

Based on the previous theories and research, the following framework was developed (Figure 3.1). Business performance is measured by the evaluation provided by the entrepreneurs, who have an overall perspective and in-depth understanding of the business. A complementary indicator is composed of the following factors: financial, customer, learning and growth, internal performance, and innovation performance. The research examines whether the access to, and the use of, information resources directly impacts business performance measures and the nature of such a connection.

To reiterate, this research tests two hypotheses:

Hypothesis 1: There is a relationship between access to information resources and business performance of entrepreneurs in incubators.

Hypothesis 2: There is a relationship between the use of information resources and business performance of entrepreneurs in incubators.

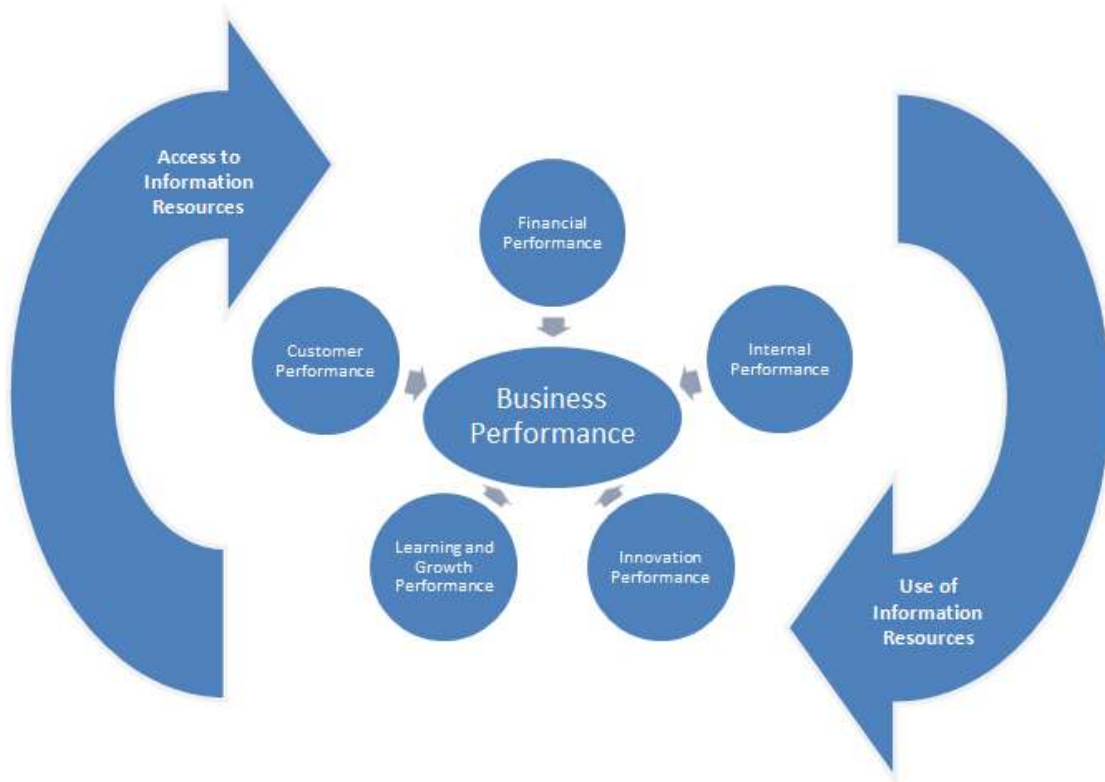


Figure 3.1 Theoretical Framework of the Study

3.2 Independent and dependent variables

Independent variables

Two independent variables are identified for use in the study. They are: the measure of access to information resources and the measure of use of information resources.

Access to information resources refers to the availability of the information resources regardless of their forms or location. In this research context, access to information resources is defined as the availability of interpersonal connections, institutional platforms, and ICT-based social networks that can meet the entrepreneurs' need for data, technology, people, and process to support their business performance.

The use of information involves a process of gathering, organizing, retrieving, analyzing, and communicating (Taylor, 2001). The result of using information resources is rarely presented in terms of tangible products or services, which raises questions regarding how entrepreneurs access and use information resources. Because of the difficulties in measuring the use of information resources, this study uses their behaviors regarding the use of information in the business process as the indicators.

Dependent variables

Business performance evaluation, which aims to investigate the companies' status from an overall perspective, is used as the major indicator. This variable has been used in the Incubator Evaluation Matrix as one of the major indexes to indicate the progress of entrepreneurial companies. In addition to the evaluation from the business owners, the dependent variables also include selected business performance indicators that are applicable to entrepreneur business context. They are financial performance, customer performance, internal performance, learning and growth performance, and innovation performance. The choice of these variables is also based upon previous theories and research that indicates that there are several commonly recognized and reliable measures for each of these variables above. These variables and measures that were employed in the data collection are listed in Table 3.1.

Table 3. 1 Dependent variables and measures

Financial Performance	Customer Performance	Internal Performance	Learning and Growth Performance	Innovation Performance
Return on asset (Goodale, 2002)	Customer Satisfaction Rate (Coram et al., 2011)	Completion of organizational goal (Kotane& Kuzmina-Merlino, 2011)	Numbers of new product and service (Kotane& Kuzmina-Merlino, 2011)	Patent counts (Griliches, 1984)
Debt Margin (Goodale, 2002)	Growth of customers per year (Chen et al., 2009)	Employee Satisfaction (Kotane& Kuzmina-Merlino, 2011)	Hours of training per employee (Coram et al, 2011)	Number of newly granted patent (Chan et al., 2012)
Revenue (Goodale, 2002)			Suggestions per employee (Coram et al, 2011)	

3.3 STUDY POPULATION

The study collects both quantitative and qualitative data. The qualitative data collection contributes to the design and validation of the questionnaire survey used in the quantitative data collection from entrepreneurs who are associated with incubators.

The author has employed a well-tested evaluation matrix used by a successful incubator. Based on the theoretical model drawn from previous research and the evaluation matrix, the researcher created a question list. To further tailor the questions to the entrepreneur business context, the researcher first carried out interviews with six different staff from the technology incubators to explore the indicators the entrepreneur best illustrate their business performance. The dependent variables were adjusted

according to the results of the analysis of the interviews. The quantitative analysis used a confirmatory approach and Structural Equation Modeling (SEM). A purposive sample of entrepreneurs was selected from technology incubators throughout the U. S. The questionnaire was sent to 63 incubators to recruit entrepreneurs for data collection. Altogether 148 responses have been received, out of which, 134 are used in the data analysis. The other 14 responses are excluded because there is too much missing data.

3.5 DATA COLLECTION

The study collects both quantitative and qualitative data. These two types of data serve different functions in the research. The qualitative data is used to create a questionnaire survey based on the business performance evaluation sheets and previous theoretical works. Its main purpose is to help the researcher justify and validate the dependent variables and to discover potentially powerful variables. The quantitative data collection was performed among entrepreneurs affiliated with incubators in the U.S., and these responses are analyzed to address the research questions.

After reviewing the Business Performance Evaluation Matrix (Appendix A), the researcher generated a question list to explore the existing and potential options of information access, information use behavior, and criteria to evaluate entrepreneurial business performance. For example, in the matrix, there is a question asking about the issue of raising grant funds, so the research developed an interview question to investigate the possible resources for the entrepreneurs to seek information about financial support. The on-site interviews were carried out to collect the information from the managing staff in a technology incubator to seek their understanding of entrepreneurial business performance indicators. The managing staffs have been working

closely with the entrepreneurial companies. Their job duties include operating the incubator, launching new companies, providing business consultation, organizing events, and carrying out semi-annual evaluation for the companies. Each of the interviews was about half an hour long, and consisted of five open-ended questions (Appendix B). These questions focus on the criteria of evaluating entrepreneurial business performance, the availability of information resources to the entrepreneurs, and the challenges of accessing these information resources faced by the entrepreneurs. These interviews were recorded and transcribed for analysis purposes. The content analysis method was applied to retrieve and summarize the significant messages, which centered on those five questions. The results extracted from the responses to those five questions were used to adjust the proposed independent and dependent variables in the model construction.

The analysis of the interview transcripts generated very interesting results. The staffs who work in the incubator reports that the entrepreneurs are provided with a variety of information resources, however, they still prefer interpersonal communication to acquire information they needs. The interpersonal communication includes talking to the incubator staff, business consultants, and other successful entrepreneurs. Most of these question are entrance-level questions, whose answers are either available on the incubator website or have been addressed in other context, but have been repetitively brought to the staff.

The questionnaire survey (Appendix C) was then developed based on the matrix and the results from the content analysis of the interview transcripts. The survey contains three sections: 1) demographic information of the participants; 2) information resources access and information use behavior of the participants; and 3) performance of the

entrepreneurial businesses. The researcher presented the survey to four entrepreneurial business experts, all of whom have years of incubator managing and directing experience, for suggestions. The original questionnaire contained 26 questions, including one open-ended question. However, the experts suggest reducing the number of the questions to 20 to increase the response rate.

The survey was carried out both online and through social networking to secure the number of responses. A survey instrument posted electronically using Qualtrics software was sent out to the 63 incubators national-wide. The incubators were selected according to a list of fast growing incubators created by the Launch website (Launch, 2014). Participants were also enrolled via convenience sampling methods. The questionnaire was also printed and distributed to entrepreneurs and their peers via interpersonal networking.

The questionnaire is composed of two sections. The first section asks the participants to fill out the demographic questions concerning the participants' personal information and the basic information of their businesses. In section two, they were invited to answer the questions about the availability of access and their information resource use behavior, as well as their business performance.

3.5 Data analysis

The data analysis was separated into two parts as a response to the research design. In the first part, content analysis was applied to extract the key indicators for entrepreneurial business performance from transcripts of the interviews. In the second part, both descriptive data analysis and Structural Equation Modeling were adopted. Descriptive data analysis was applied to analyze the demographic data. In terms of the

data reflecting business performance, access to information resources, and use of information resources, a Structural Equation Modeling (SEM) approach was employed to process and analyze the data. The researcher decided to use the statistical software package R to process the data.

Structural Equation Modeling

Structural Equation Modeling (SEM) is a well-known statistical method in social science studies. It is a tool for analyzing multivariate data. SEM allows the consideration of simultaneous equations with not only the observable variables, but the endogenous variables as well (Bollen and Long, 1993). It also provides a means to test the specified set of relationships among observable variables and endogenous variables to demonstrate a big picture and enables theory testing when experiments cannot be conducted. Latent variables, which are not observed directly but have to be observed from other directly measured variables, are also used in this method for model construction. Therefore, the SEM is very suitable to be used to test the hypotheses that involve abstract factors, such as customer satisfaction.

SEM is capable of incorporating multiple independent variables as well as dependent variables. It is used to identify the relationship between independent and dependent variables by providing the Confirmatory Factor Analysis (CFA). A Confirmatory Factor Analysis is a form of factor analysis applied to test whether the measures fit a hypothesized measurement model, while Exploratory Factor Analysis (EFA) is often used to identify the underlying relationships among a set of variables (Child, 2006). Unlike traditional regression models, SEM conducts a multidimensional analysis, and the structural equations are meant to present causal relationships among the

variables in the model. Therefore, it is very possible that a variable in one equation appears as a predictor in another equation, or variables in the model reciprocally influence one another.

Compared with the Linear Correlation and Linear Regression Models, SEM is more suitable for this study. The Linear Correlation Model is intended to indicate the statistical relationship between two random variables. The two variables are supposed to be equal; neither change depending on the change of the other, therefore, the result will hardly present the consequential relations between the two variables. The Linear Regression Model, though specifically defining the dependent and independent variables in the model, provides the direct consequences among the variables but is not able to show the possible indirect relation, or the negative correlations between certain indexes. In addition, the overall result cannot be explained. SEM has compensated for these statistical disadvantages by allowing multiple indicators of latent constructions and enables the identification of the possible structural relationships among the variables.

Bollen and Long (1993) have summarized the SEM process into five steps:

1. model specification
2. identification
3. estimation
4. testing fit
5. respecification

In this process, model specification is where the researcher starts formulating the initial model prior to estimation. The estimation usually builds on existing theory or past research in the area. Identification is conducted to identify unique values for the

parameters employed by the specified model. Generally, there is more than one estimation method available for the specified model. The selection is often determined by the nature of the variables being analyzed. In most cases, it is reasonable to allow the SEM program to generate initial start values (Tabachnick and Fidell, 2007). Once the estimation method is chosen, the researcher can test the model by filling the data in to see if the data and model are consistent. If they are, the process can be stopped; otherwise, respecification must be applied to improve the model. The adjusted model must go through the last four steps of this process until the data fit the model.

A Structure Equation Model typically consists of a measurement model and a structural model (Byrne, 2001). The measurement model depicts how the unobserved latent variables are measured by indicator variables. The structural model displays the relationships between latent variables. The model can be developed through a data graphic. Each variable can be represented by an item within the graphic, with an indication of relevant or irrelevant connections with other variables.

3.6 Research ethics

As this research involves human subjects, the issue of research ethics needs to be seriously considered. According to the research ethic protocol held by the University of South Carolina, this proposal was submitted to the E-IRB system and approved.

CHAPTER 4

DATA ANALYSIS

4.1 Introduction

The purpose of this study is to investigate whether the access to and use of information resources of the entrepreneurs affects the business performance of their company. This chapter presents the findings from the analysis of the results.

Demographic data are provided, followed by the findings of the structural equation model. One hundred and forty-eight responses were received, out of which one hundred and thirty-four were used in the analysis.

4.2 Demographic data

Age

The age of the participants ranges from 21 to 76. As shown in Figure 4.1, more than 50% of them are between 30 and 40. The number of entrepreneurs declines as the age increases after 30.

Gender

Figure 4.2 shows the gender distribution of the participants. Among those who responded to the survey, 50.4% (67) are male entrepreneurs and 49.6% (66) are female entrepreneurs (1 missing data), which indicates balance between the two genders.

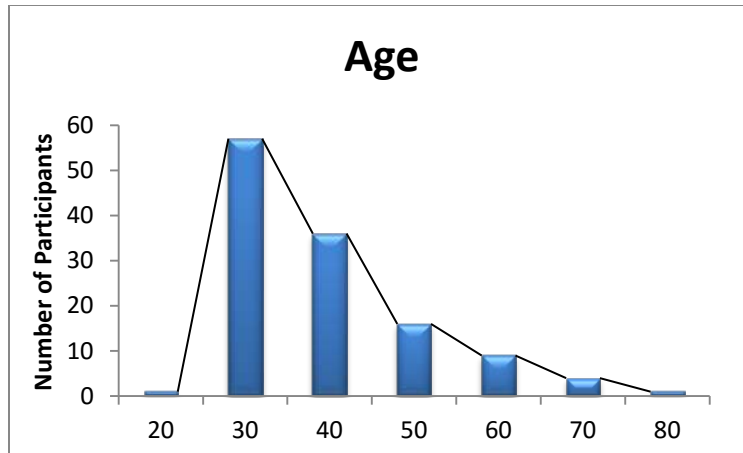


Figure 4.1 Age of the participants

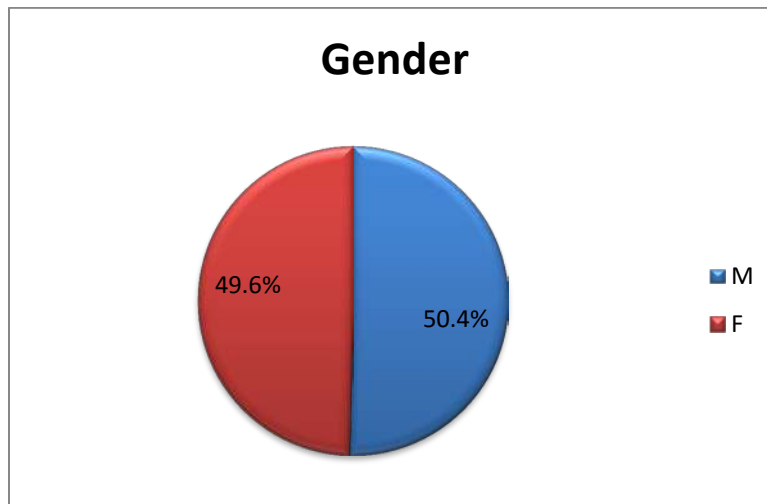


Figure 4.2 Gender of the participants

Education Background

A large proportion of the participants have a higher education background (i.e., they hold a Bachelor's or a Master's degree). However, the number of entrepreneurs declines at the level of a doctoral degree (Figure 4.3).

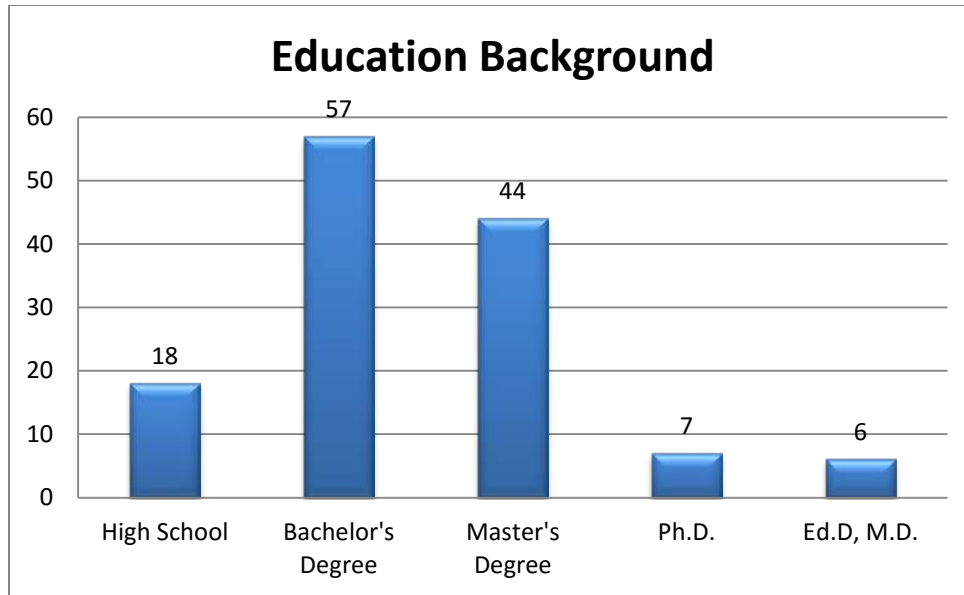


Figure 4.3 Education background of the participants

The North American Industry Classification System (NAICS)

NAICS (North American Industry Classification System) is a code used to classify business establishments for the purpose of data collection, analysis, and publication of statistical reports related to the U.S. economy. The NAICS codes of the entrepreneur businesses were also collected through the survey. However, fewer than 25% of the participants provided the NAICS codes of their organizations on the survey. Some of the respondents (12%) described their business, which suggests that they are not familiar with this classification system. Over half (64%) of the surveys were left blank on this question (57%), or filled out with question marks or phrases such as “have no idea” and “don’t know”(7%).

Entrepreneurial experience

Fifty-five percent of the respondents reported that this is the first time that they started a business (Figure 4.4). The rest of them (45%) have owned businesses before,

among which, 28% percent (37) have claimed success (i.e., either still operating or sold out their companies) in their previous entrepreneurial experiences.

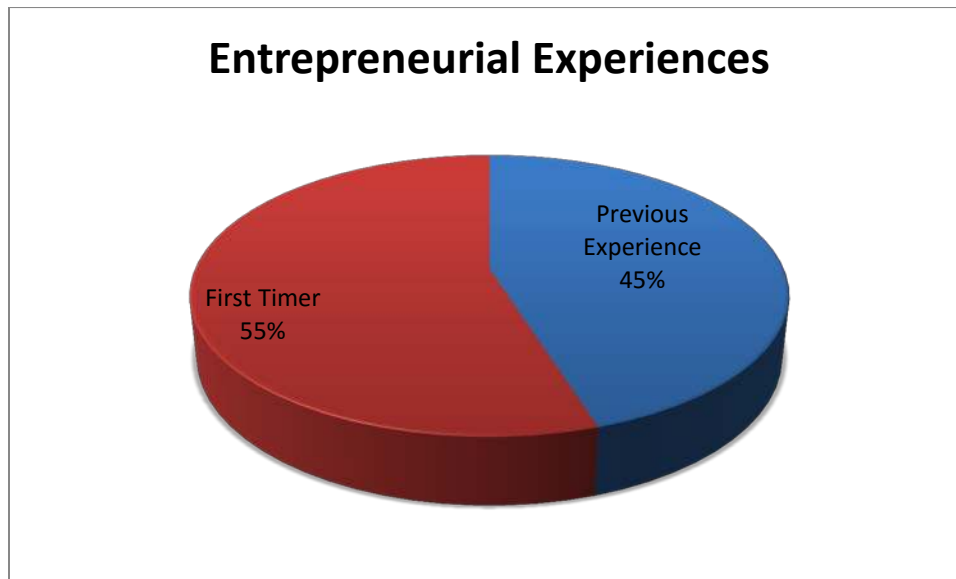


Figure 4.4 Entrepreneurial experiences

4.3 Exploratory data analysis and model specification

There are two steps involved in the data analysis. First, an exploratory data analysis was used to examine the main characteristics of the data. Second, the results of the data analysis are examined for goodness of fit. The goodness of fit test is used to determine whether the associations of the variables are consistent with the hypothesized distribution, which is regarded as the initial stage to observe the stability of a model.

Exploratory Data Analysis

This section summarizes the results of the exploratory data analysis. The response rates on four of the survey questions are extremely low, i.e., below 50% response rate.

These four questions include:

- 1) Question 16.1: What is your revenue growth in the past 6 months? (Amount)
- 2) Question 16.2: What is your revenue growth in the past 6 months?
(Percentage change)

- 3) Question 17: How much money have you raised in the past 6 months from outside sources?
- 4) Question 18: How many patents do you currently own or are pursuing?

Table 4.1 Response rate of questions

Questions	Revenue Growth (Q16.1)	Rate of Revenue Growth (Q16.2)	Investment Attracted (Q17)
Responding Rate	35.88%	31.30%	43.51%

As shown in Table 4.1, three out of the four questions (Revenue Growth, Rate of Revenue Growth, and Investment Attracted) were purposely designed to collect information on the financial status of the companies. The response rates of all these three questions are below 50 percent. The other question that received relatively fewer responses (51.91%) is the “Number of Patents,” which is one of the indices that reflects the innovation stage of a business. The response rate narrowly passed 50 percent.

Due to the low response rate for these four questions, these variables were excluded from the model. The analysis of the remaining data, however, delivers some interesting information. Although the mean of the companies’ revenue is around \$160,000 (Figure 4.5), most of the businesses generate revenue between zero to \$2,000,000. The results also show a great difference in revenue among businesses (Mean = \$162,879 and Standard Deviation = \$427,196).

The average investment attracted by the entrepreneurs is \$103, 914. Most of the respondents attracted less than \$500,000 from outside sources in the past six months, but there are a few exceptional businesses who received up to two million dollar investment (Figure 4.6). This large gap is also reflected by a standard deviation as high as \$530, 437.

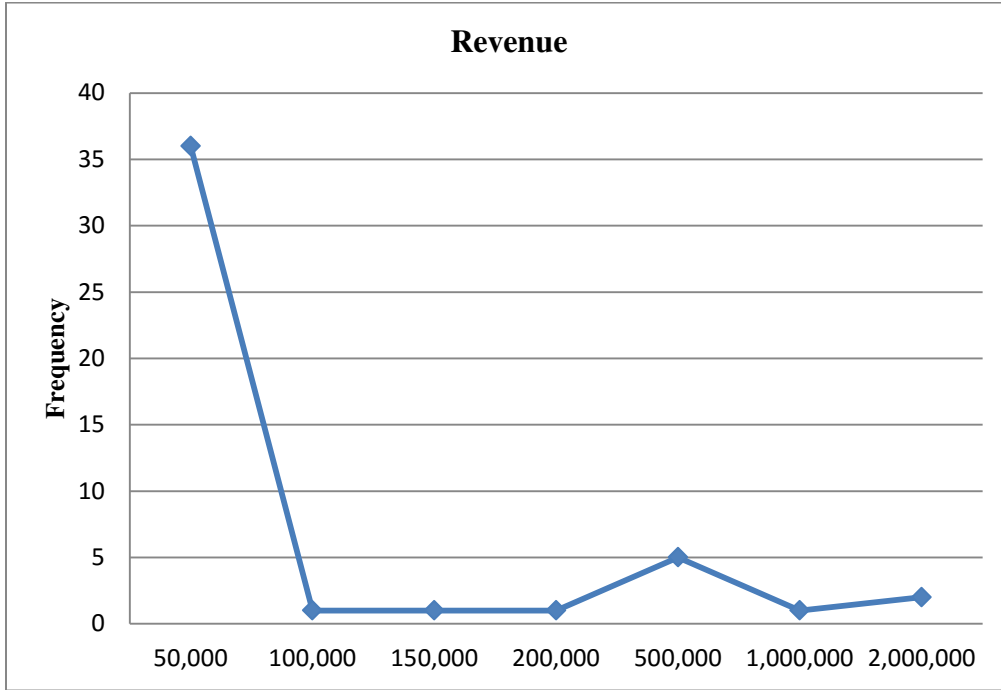


Figure 4.5 Revenue growth

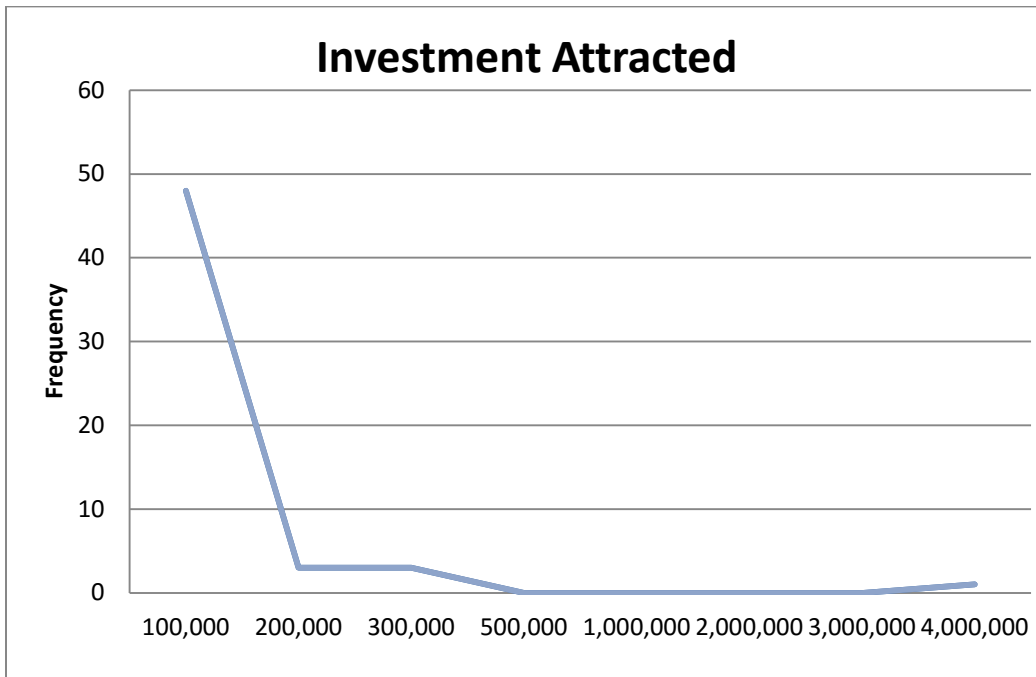


Figure 4.6 Investment attracted

The number of patents held or being pursued also varies from business to business. Although the result shows that the companies on average hold 1.21 patents, the number is not evenly distributed. Over 90% of the respondents reported holding fewer than five patents, while 3% of the companies hold more than fifteen (Figure 4.7).

Model Specification

Two structural equation models, which were developed based on previous research and interviews, were tested. The Access-Performance model (Figure 4.8) was applied to demonstrate the aggregate effects of accessing information resources on business performance; while the Use-Performance model (Figure 4.9) was used to represent how business performance was affected by the choice of information resources used. A series of code was created to represent the measurable variables for information resources used in the models (Table 4.2). These variables are identified in rectangular frames A1 to A18. These codes are explained in Table 4.2. The oval frames represent latent variables. The arrows indicate direct effects between variables. The dependent variables are in black and the independent variables are in lighter colors.

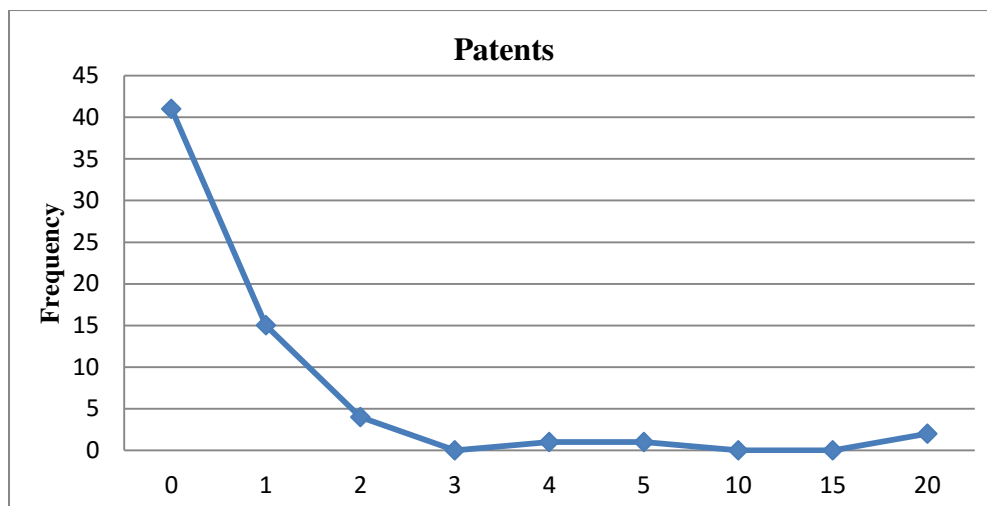


Figure 4.7 Patents in holding or in pursuing

Table 4.2 Codes for information resources access

A1	A2	A3	A4	A5	A6
Personal experience	Family, friend(s), or co-workers	Other entrepreneurs	Customer	Consultant, specialist, or expert	Education institution
A7	A8	A9	A10	A11	A12
Library	Database vendor	Business professional association	Government department and service	Consulting firm	Radio
A13	A14	A15	A16	A17	A18
Television	Landlines	Cellphones	Computer, laptop, tablet	Internet	Social network

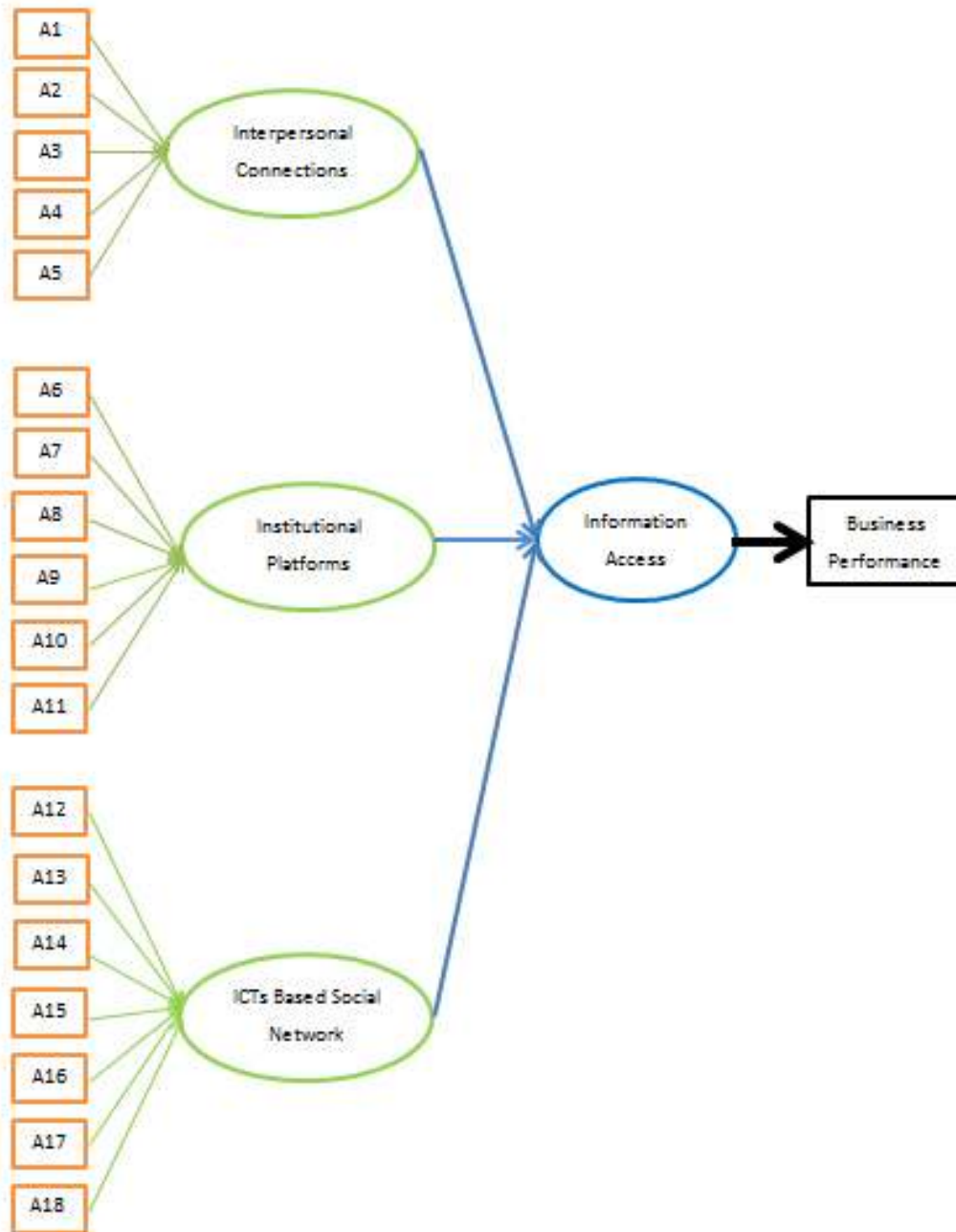


Figure 4.8 Access-Performance model

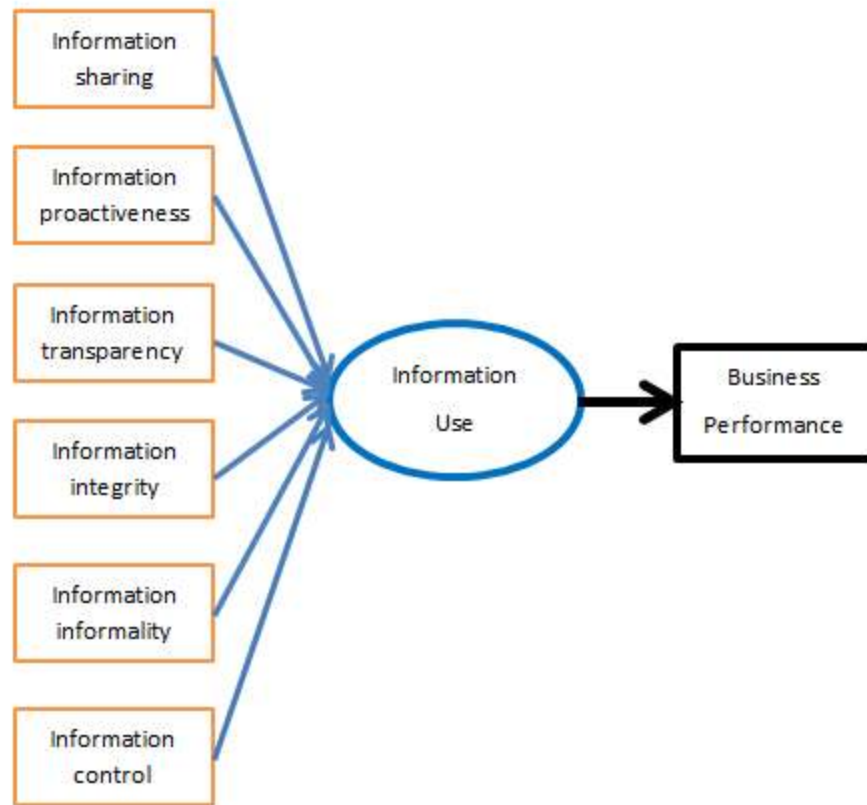


Figure 4.9 Use-Performance model

4.4 Confirmatory Factor Analysis and Model Fit

Different from Exploratory Factor Analysis (EFA), which determines what factors mean and how many factors should be included, Confirmatory Factor Analysis (CFA) is an approach to test whether the data and model construct are consistent with the researcher's hypotheses (Joreskog & Sorbom, 1996). CFA is often used as a first step to access the proposed model in Structural Equation Modeling (SEM).

Model fit refers to how the model best represents the data reflecting the underlying theory. A collection of indices is typically developed for researchers to select those variables that best fit the model. Absolute fit indices determine how well the proposed model fits the sample data (McDonald and Ho, 2002). However, the fit often

varies by factors that include “sample size, model complexity, estimation method, amount and type of misspecification, normality of data, and type of data” (Brown, 2015, pp.74).

In this research, Chi-Square, Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMSR) are used as absolute fit indices to assess the models. The Chi-Square value is the measure for evaluating the overall fit of the model. According to Hooper and her colleagues (Hooper et al. 2008), a good model fit should provide an insignificant p-value ($p > 0.05$). The Chi-square in SEM refers to the discrepancy function. If Chi-square is not significant, it indicates the observed covariance matrix is similar to the predicted covariance by the model, therefore, the model is regarded as acceptable. On contrary, if the Chi-square is significant, the hypothesis that the observed covariance matrix is not similar to the predicted covariance matrix will be rejected. Then there is high probability the model is unacceptable. The RMSEA indicates how well the model is based on optimally chosen parameter estimate fitting the population covariance matrix. A value less than 0.07 suggests a good fit and a value less than 0.03 suggests an excellent fit (Steiger, 2007). SRMSR calculates the square root of the difference between the residuals of the sample covariance matrix and the proposed covariance model. A value less than 0.08 is accepted as a good fit indicator (Hu and Bentler, 1999). Using the measures of fit identified above, the results are presented for each of the two models: 1) Access-Performance model; 2) Use-Performance model. These results are described in the following section.

Access—Performance model fit

Although the data were selected for theoretical reasons or based on previous research, the results of the confirmatory factor analysis do not demonstrate a good fit of the original Access-Performance model. As shown in Table 4.3, the P-value is below 0.05. The RMSEA of the collecting data is 0.13, which exceeds the qualifying value of 0.07. These two values, along with a SRMSR as high as 0.082, indicate that there is a probability that the model is not stable, therefore, the model should be rejected.

Table 4.3 Access—Performance model fit

Number of observations	131
P-value (Chi-square)	0.000
Root Mean Square Error of Approximation (RMSEA)	0.130
Standardized Root Mean Square Residual (SRMSR)	0.082

The analysis also shows the statistical significance of the factor loading between latent variables and observed variables. Few of them show values above 0.05, suggesting a probability of rejecting the hypothesis that “there is a significant impact on business performance.” Table 4.4 lists the items having a P ($>|z|$) value larger than 0.05. It shows that information access as represented by the latent variable of ICT-based social network has a relatively low probability of affecting business performance.

Among all the observed variables supporting ICT-based social network, the variable television, scores the highest P ($>|z|$) value (0.693), followed by Landlines (0.214), Cellphones (0.189), Social network (0.187), Computer/laptop/tablet (0.186), and Internet (0.184). The probability of rejecting the hypothesis is based on the observed variables having significant impacts on the latent variables, which could possibly reflect a

mistake in the conceptual framework when this model was developed. Other variables of information access besides the existing ones should be taken into consideration and tested in a modified model. Such a problem may also be caused by the small sample size or the complexity of the model.

Table 4.4 Significant test of variables in Access-Performance model (P (>|z|))

			P(> z)
Business performance	←	ICTs based social network	0.185
ICTs based social network	←	Television	0.693
ICTs based social network	←	Landlines	0.214
ICTs based social network	←	Cellphones	0.189
ICTs based social network	←	Computer/ laptop/ tablet	0.186
ICTs based social network	←	Internet	0.184
ICTs based social network	←	Social network	0.187

Use—Performance model fit

The Confirmatory Data Analysis result shows a goodness of fit of the Use-Performance model (Table 4.5). The P-value (Chi-square) is 0.587, the RMSEA value is smaller than 0.03, which is the standard of excellent fit, and the SRMSR value is below 0.05. These results suggest that there is small probability that this model will be rejected. Therefore, the Use-Performance model is accepted as a stable model to manifest the relationship between the independent and dependent variables.

Table 4.5 Use—Performance model fit

Number of observations	131
P-value (Chi-square)	0.607
Root Mean Square Error of Approximation (RMSEA)	0.000
Standardized Root Mean Square Residual (SRMSR)	0.046

4.5 Structural equation model

The Confirmatory Factor Analysis was conducted to verify the construct logic and data fit of the models. In the previous section, the results showed that the Access-Performance model lacks goodness of fit. Therefore, in this section, structural equation modeling is only utilized to address the complexity among the variables in the Use-Performance model.

The adequacy of parameter estimates is reflected by how well the observable variables fit in the model, the statistical significance, and the standard errors (Klain, 2015). The assessment of the whole model is measured through a variety of goodness-of-fit statistics, which are heavily dependent upon the constraints and limitations of the data and the factorial structure of the model. The model in Figure 4.10 shows everything including the standardized factor loading among variables. The left part of this model illustrates the independent variable “Information Use,” and how, as a latent variable, it is reflected by the observable variables. The relationship between the information use latent variable and the business performance observable variable on the right explains how the independent variable is related to the dependent variable.

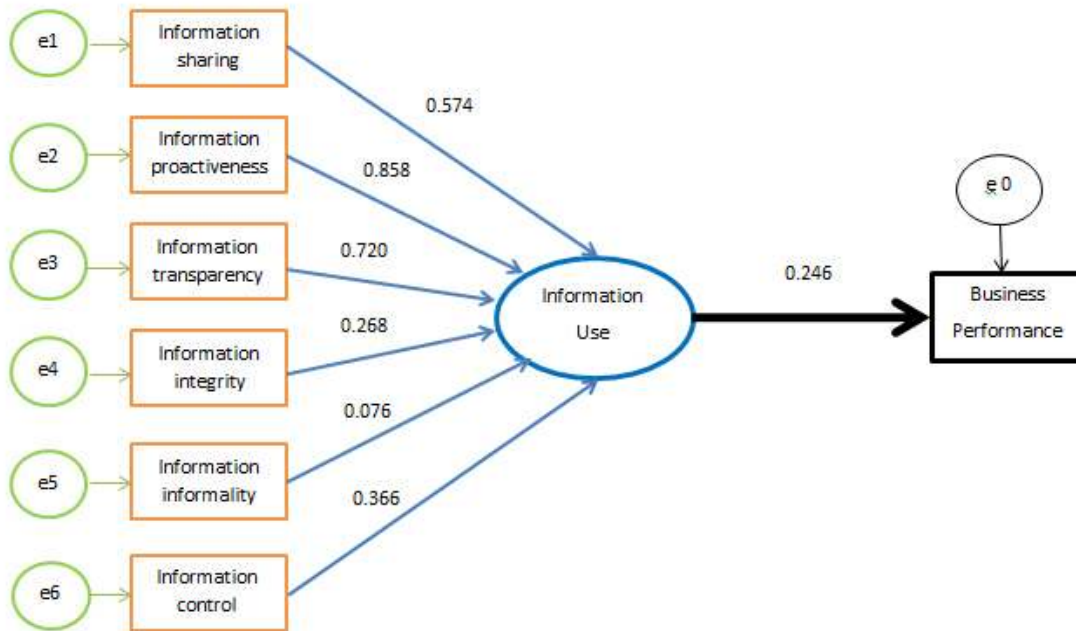


Figure 4.10 Use-Performance model with parameter estimate

The latent variable “Information use” is measured by six variables: Information sharing, Information proactiveness, Information transparency, Information integrity, Information informality, and Information control. Table 4.6 lists the parameter estimates among the variables. The highest score is Information proactiveness (0.858), followed by Information transparency (0.720), Information sharing (0.574), Information control (0.366), Information integrity (0.268), and Information informality (0.076). The score shows that these measures all contribute to the construct of Information use. The positive score suggests a positive influence of the observed variables on the latent variable.

Table 4.6 Use—Performance model standardized parameter estimate

Parameter Relationship			Parameter Estimate
Business performance	←	Information use	0.246
Information use	←	Information proactiveness	0.858
Information use	←	Information transparency	0.720
Information use	←	Information sharing	0.574
Information use	←	Information control	0.366
Information use	←	Information integrity	0.268
Information use	←	Information informality	0.076

According to Wang et al. (2011), a parameter estimate value over 0.4 indicates a strong relationship between the variables. Therefore, the results suggest that Information proactiveness, Information transparency, and Information sharing are statistically strong measures for Information use. Information control, Information integrity, and Information informality carry a factor loading lower than 0.4, which suggests that they are weak indicators for Information use. It is likely that the low factor loading score, while significant, indicates that while these measures contribute to the construct of information use, their contribution to explaining the variance (i.e., the latent variable) is less and provides a weaker explanation.

The standardized parameter estimate (Table 4.6) shows the factor loading between Information Use and Business Performance is 0.246. The positive score suggests that that the relationship between Information Use and Business Performance is statistically significant. This result suggests that there is a relationship between the use of

information resources and entrepreneurial business performance and that information use has a positive influence on business performance. However, as the value is below 0.4, there is not enough evidence to support a statement that Business Performance is strongly affected by Information Use.

The low score (0.246) could be explained in several ways. First, Information Use is measured by six variables, three of which are not strongly, albeit positively, related to Information Use. Second, it is also likely that not all of the achievements/failures of Business Performance are a result of the use of information resources. Economic climate, policies, financial status, managing skills, and many other factors all cast roles in a company's survival and development. Third, another possibility that Information Use and Business Performance are not strongly correlated is that it takes time for the outcomes of Information Use to be reflected in Business Performance. That is, there is a time lag starting from using information resources to actually transforming it into products, services, or managing skills. The length of the cycle is different from company to company, industry to industry, time period to time period.

4.6 Summary

Both Access-Performance model and Use-Performance model were assessed with Confirmatory Factor Analysis. The results show that there is not a good fit of the Access-Performance model to the data, but there is an excellent goodness of fit of the Use-Performance model to the data.

The Structural Equation Model targeted the Use-Performance model returns the factor loadings for the individual parameters, which suggests that the model is successful in representing the relationships between the measured variables and the latent constructs.

The results of the standardized parameter estimates support the premise that Information proactiveness, Information transparency, and Information sharing are the strongest indicators of Information Use in this study.

The result of the factor loading between Information Use and Business Performance indicates that Business Performance is positively influenced by the use of information resources. This finding supports the perspective that there is a relationship between Information Use and Business Performance. The parameter estimate (0.246) also leads to the point that the Information Use has impacts on Business Performance; however, it is not the only determinate factor. It is also possible that there is a time gap between adopting the information resources to the point that the benefit is actually reflected on performance.

The models provide a reasonable approach to studying the effects of the access and use of information resources on business performance. Though rejected, the Access-Performance model especially provides thought-provoking information for considering the factors, which represent access to information. The standardized parameter estimates in the Use-Performance model suggests a positive relationships between the latent and observable variables of information resources use and business performance. In addition, the overall fit of the model appears to be significant. The associations between the independent and dependent variables support the concerns raised in this study, i.e., that Information Use influences Business Performance, but not as a single determinate factor. Therefore, it will not be sufficient to predict the business performance solely relying on the use of information resources. However, there is strong support that business

performance benefits from use of information resources, especially through information proactiveness, information transparency, and information sharing.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Introduction

The purpose of this study is to investigate the relationship between access to and use of information resources of entrepreneurs and their business performance. In this chapter, I discuss the results from the analysis in previous chapter and provide a conclusion to this study based on the discussion and the results.

5.2 Discussion

Business performance is a determinant of the survival and success of entrepreneurial organizations. Business performance can be enhanced through the improvement of the essential sectors within the organization, i.e., creating new products, attracting investment, and discovering potential markets. As the global economy moves toward an information intensive mode, the emerging companies are pushed into a situation that requires more interactivity, connectivity, and innovation. Therefore, the information industry and information professionals are expected to provide ever faster, customized, and easily accessed products and services. It is also important for both information providers and users to embrace the fact that information and knowledge play an enormous role in the progression of business, not only as a tool for marketing or strengthening customer relationships, but as powerful assets for long term development.

Entrepreneurs are frequently credited for boosting the economy and being the driving force for innovation. In addition to relatively small size of the company they own entrepreneurs have other unique identifying characteristics. The population is diverse, their expectations for their businesses and the approaches they take are different from larger corporations. The demographic data analysis reports that the studied population in this study holds various backgrounds in age, education, and business experiences, which indicates the threshold of starting entrepreneurial businesses is relatively flexible compared with capital and labor intensive industries. An interesting phenomenon revealed by the analysis is that only a small proportion of the respondents provided the NAICS code of their business. The NAICS code, which superseded the SIC code is an identification tool for federal agencies to classify business establishments and manage the data. It can be located on the United States Census Bureau website and other resources. The absence of this code in many survey responses indicates that the entrepreneurs were either not aware or were not willing to locate such information through the available tools. In the first case, those entrepreneurs may not be aware of such resources, therefore, they might have missed the opportunities of receiving the information regarding the preferential policies, grant announcements, or training programs, which intend to encourage business development in a specific industry. In the second case, the phenomenon implies that the entrepreneurs were not willing to locate such information through the available tools by themselves. It is a reflection of the participants' information behavior. The lack of activeness, which exists in their seeking of information will not only hinder their use of existing information and knowledge, but also stop them from exploring potential resources. The restriction of outreach also influences

decisions about how to develop their companies. There is also a possibility that the participants are not familiar with the NAICS code, but using the Standard Industrial Classification code to identify themselves.

The participants were also disinclined to answer questions that are relevant to their business financial status and innovation (number of patents). Also, uneven responses appear in the answers for the number of patents held or pending. The conservative attitude towards revealing financial and innovation factors can be understood as a protective measure for keeping their competitive advantage. This is another assumption that the conservative attitude may be related to taxation or funding policies, which they would like to answer after consulting with specialists.

The Access-Performance model, because of the lack of goodness of fit, was not accepted to support the hypotheses that there is a relationship between information resources access and business performance. However, the result is very thought-provocative. As expressed before, the selection of these variables is derived from the availability of previous research and existing evaluation matrix. The provisional model suggests that the construct variables of information resources access have changed over time. There could be some information resources that this research failed to take into consideration while they actually support the entrepreneurs' business activities. It also brings up another issue that the information services and professionals should discover and create new resources and approaches in order to fulfill the needs of this proactive and innovative group. Another explanation for the lack of goodness of fit could be that rather than relying on single access, the entrepreneurs are shifting to a multi-functional information complex for data acquisition. For example, some business incubators do not

only serve as infrastructures or physical locations, but also as origins of network resources for start-up companies (Pettersen et al., 2016). These incubators “strive to develop robust business and social networks to bring value to their resident companies in the form of intellectual and material resources” (Cooper et al. 2012, p. 433). This change may also lead to a trend that founders of businesses in initial stages are more inclined to join the incubators in seeking networking opportunities and fostering their private access to information resources.

The evaluation of the Use-Performance model indicates the model has a relatively low probability of being rejected, because the data fits the model excellently. The results of the analysis show that there is a relationship between the use of information resources and the business performance of the entrepreneurial companies. The user behaviors have a positive influence on the development of the businesses, but do not serve as a strong determinant. An assumption stemming from this result is businesses in initial stages either have not found steady and suitable information resources or have not been forged in a systematic manner in seeking and using information resources, therefore, the consistency and quality of the information and knowledge they attained cannot be guaranteed. This kind of information and knowledge can hardly be applied (or may do very little) to help improve the businesses.

Among the observed dependent variables, information proactiveness, information transparency, and information sharing have excessive high scores in supporting the model constructs. The results indicate that information is actively obtained and applied to promote innovation, spot and correct errors, and support collaboration. It is not surprising to see that these three variables get such deep involvement in business operation and

development. As mentioned in previous chapters, entrepreneurial businesses are less equipped with funds, human resources, and managerial skills compared to larger companies. They heavily depend on innovative products and services to gain competitive advantage. Information proactiveness, information transparency and information sharing facilitate the flow of information and knowledge, which effectively helps the entrepreneurs to discover the emerging market, cut costs, and promote the internal growth of the organization. The fact that most of the entrepreneurial companies are comparatively small in size also creates an environment for information behaviors like these. The smaller size of the companies provides a flatter organizational structure, and promotes a less hierarchical relationship among the business owners and their employees. The flexibility and simplicity of the structure allows information and knowledge to travel fast at an inexpensive cost. There is a probability that these companies, after visioning the benefit brought by such behavior, will endeavor to integrate it into the organization culture, so that the positive influence can be expanded to the whole company. However, as the business grows and the number of the employees increases, there is no guarantee that the attitudes towards the use of information resources will stay exactly the same. Elaboration and adjustment will be definitely needed in the follow-up steps.

The information informality in this research refers to the willingness to use and trust informal sources over institutionalized information. The low factor loading indicates that this variable is not strongly related to the information use behavior. The positive result indicates that the entrepreneurs' tolerance of informal sources has little probability of hindering the use of information resources. This supports the results from previous

research that entrepreneurs are more willing to take risks and have a higher tolerance of uncertainty.

5.3 Implication of the study

This study has made a comprehensive, complex investigation of the nature of the relationships between information resources and business performance. It has expanded the scope of previous research by integrating both the access and the utility of information resources with the development of entrepreneurial organizations. This study has included a broad range of data relevant to the information infrastructure available to the entrepreneurs and their information use behavior within the organizational context. It has included the descriptive data of the entrepreneurs concerning their formal business launch history, as well as their preferences towards the available information resources.

This study brings together literature from multiple disciplines. The multidisciplinary approach allows the researcher to take a new perspective and create a theoretical foundation incorporating studies from business, management, communication, and information science. A model of the role of the access to information resources in business performance and a model of the role of the use of information resources were constructed separately. Both models have included a customized definition of business performance in response to the uniqueness of the entrepreneur group.

The lack of fit in the Access-Performance model shows unexpected, yet very intriguing implications. The model has included 18 information resources that are frequently mentioned in previous research. However, the results indicate that other factors should be considered during the model construction in addressing the role of information resource access in development. It is also a sign that the entrepreneur has

shifted from traditional and regular information resources to some innovative, edge-cutting media and connections. It makes great sense considering the characteristics of the target group; particularly most of them are the creators and the promoting forces of such innovation. This issue has not been addressed sufficiently as reflected in both the literature and the evaluation matrix. However, it is extremely significant for the information providers and decision makers to realize such trends in order to cope with the evolution of the field.

The Use-Performance model reflects that the utility of information resources is positively involved in business performance. Scholars have related the information culture of an organization to its effectiveness and development (Choo, 2013; Vick et al. 2015). The results confirm this connection, and further explicitly reveal the roles each variable plays in the big picture. As the openness of information use behavior increases, the entrepreneurial businesses are most likely moving towards their objectives. The results of this study then raise concerns about the influence of the entrepreneurs' information behavior. The major issue would be how to guide the entrepreneurs to develop positive attitudes and proactive behavior in using information resources, and let the attitudes and behavior root in the organizational culture to benefit future growth.

5.4 Limitations

The primary limitation of this study was the data. The participants were not willing to share their financial status or the state of patent ownership. It is understandable that they are protective of such information, which can be classified as business intelligence. The amount of missing data is also high in NAICS code. The absence of the

data makes it extremely difficult to compare the research results from industry to industry, and therefore, narrowed the intended scope of this study.

The other limitation of the study is the bias generated from the variables. It is almost impossible to split the influence of information resources from other business activities or environment changes, such as marketing and economic crisis; therefore, the credit of improving the business performance should not be exclusively attributed to the access to or the use of information resources. It should also be noticed that there is a time lag between the adoption of information resources and the value being transferred to products and services. Although the research tried to minimize the bias by restricting the time range in the survey questions, it is possible that the data did not reflect the overall effects caused by the access to and the use of the information resources.

5.5 Future Research

This study has provided a solid base from which to cultivate future research. It has raised additional questions about the role of the access to and the use of information resources in business development. Research is needed to further explore these questions from a variety of areas and from an innovative stand point.

It is important to understand the entrepreneurs' attitudes towards the disclosure of their financial information and business secrets and the reasons behind it. The answer will definitely enhance the research on information behavior of the entrepreneur community. In addition, it will help break the barriers of the exchange of business information, such as funding opportunities, emerging technologies, and potential markets.

The preliminary Access-Performance model indicates the needs for model adjustment and reconstruction. The assumption of the existence of information resources

in other formats can be tested. A triangulation of qualitative data from the test and from this present study combined with quantitative data assessment would provide an interesting study of redefining information resources. Studies can also be carried out to investigate the entrepreneurs' preferences for information resources, which would be a significant guide for information professionals in developing collections and providing services. There is more work need to be done regarding the preferred information resources and communication approaches of entrepreneurs in different industries. Categorizing data sets collected according to the NAICS code or the SIC code would greatly facilitate the information professionals and institutes locating the data and producing customized services to their patrons at a reasonable cost. It will strongly enhance the branding and marketing of organizations, such as libraries and consulting firms.

Studies are also needed in exploring the impacts of information resources use on business performance beyond the entrepreneurship arena. Utilizing the Use-Performance model from this research, this issue can be investigated in the small business context and among large corporations. By comparing how this model fits in these three contexts, the research will have a better understanding of information behavior of the users in different business environment and which variables have positive influence on business success. The research will provide suggestions to the users, who are experiencing or are ready to experience business transformation, on how to use information in an effective way to gain the competence in a new environment. It will also help the information professionals and services make strategic planning on serving the business communities with more accurate focuses.

There is also research to be done to explore the relationship among different variables. Study the correlations between the demographic features (e.g., age, gender, and business experience) of the entrepreneurs and their business performance will help the policy makers and scholars depict the structure of this group, so that they can have a better understanding of this community and make proper adjustments on the policies or the research strategies. It will also be interesting to see if the access to information resources has any influence on the entrepreneurs' use of business information. This will be a good start point to observe the factors involved in information behavior change within business context.

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APPENDIX A – SURVEY MATRIX FROM INCUBATOR

USC/COLUMBIA TECHNOLOGY INCUBATOR CURRENT COMPANY ECONOMIC IMPACT SURVEY	
Company Name	
Year Company Was Incorporated	
Date Company Entered Incubator	
Company Address	
Industry Classification (NAICS code)	
Contact Name/Title	
Contact Telephone	
Contact Email	
County Most Staff Reside	
How many people currently are employed full-time (at least 32 hours per week) at your business?	
How many people currently are employed part-time (less than 32 hours per week) at your business?	
What is the dollar amount of total salaries and wages your company paid last month?	
What is the average salary of your full time employees?	
What is the dollar amount of your company's gross revenues for the past 6 months?	
What is the dollar amount of debt capital (bank loans, loans from family/friends, and other loan sources) raised in the last 6 months?	
What is dollar amount of equity capital raised in the past 6 months? (Include funds from angel investors, venture capitalists, seed funds, and other sources of equity capital)	
What is the dollar amount of grant funds (SBIR, state grants, etc.) raised in the past 6 months?	
How many IP patents do you current own?	

APPENDIX B – INTERVIEW QUESTIONS

1. What do you offer to the entrepreneurs as information resources in your organization?
2. Do you know if any entrepreneurs in your organization have experienced any difficulties accessing those information resources? If yes, what could be the reason for such problems?
3. Which resources do the entrepreneurs in your organization prefer to use?
4. What do you think is the most important standards to evaluate the entrepreneurial business performance?
5. What is greatest challenge for you in providing information services to the entrepreneurs in your organization?

APPENDIX C – QUESTIONNAIRE SURVEY

Information Impact on Entrepreneur Business Performance (Access and Use))

Q1 Age:

Q2 Gender:

- Male
- Female

Q3 Educational Background:

- High School
- Bachelor's Degree
- Master's Degree
- Ph.D.
- Others (e.g., Ed.D, M.D.)

Q4 What is the NAICS (North American Industrial Classification System) code of your business?

Q5 How long have you run your current business? (Months)

Q6 Do you have previous entrepreneurial experience?

- Yes
- No

Answer If Do you have previous entrepreneur experience? Yes Is Selected

Q6.1 In this study, business success is defined as a business that is still going or one that is sold for profit. Based on this definition, did your previous business succeed?

- Yes
- No

Q7 Please select all that apply as the sources from which you seek information for your business:

- Personal experience
- Family, friend(s), or co-workers
- Other entrepreneurs
- Customer
- Consultant, specialist, or expert
- Educational institution (e.g., faculty, students)
- Library
- Database vendor
- Business professional association
- Government department and service
- Consulting firm
- Radio
- Television
- Landlines
- Cell phones
- Computer/laptop/tablet
- Internet
- Social network (e.g. LinkedIn)

Q8 Of those you selected in Question 7, please rank your top 5 resources according to frequency of use, where 1 is the resource you use most, 5 being the one you use least.

- _____ Personal experience
- _____ Family, friends or co-workers
- _____ Other entrepreneurs
- _____ Customer
- _____ Consultant, specialist, or expert
- _____ Educational Institution (e.g., faculty, students)
- _____ Library
- _____ Database vendor
- _____ Business professional association
- _____ Government department and service
- _____ Consulting firm
- _____ Radio
- _____ Television
- _____ Landlines
- _____ Cell phones
- _____ Computer/laptop/tablet
- _____ Internet
- _____ Social network (e.g. LinkedIn)

Q9 How much do you spend (in US dollars) on information resources every year?

Q10 Information Sharing. (Please use a scale of 1 to 5 rate the following statement, 1 for least agree, 5 for strongly agree)

	Disagree	Somewhat disagree	Neither Agree nor Disagree	Somewhat agree	Agree
I am willing to share information with others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q11 Information Proactiveness. (Please use a scale of 1 to 5 rate the following statement, 1 for least agree, 5 for strongly agree)

	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat agree	Agree
I actively look for and use new information to respond to changes in my organization and promote innovation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q12 Information Transparency. (Please use a scale of 1 to 5 rate the following statement, 1 for least agree, 5 for strongly agree)

	Disagree	Somewhat disagree	Neither Agree nor Disagree	Somewhat agree	Agree
When I find mistakes in our business operation, I share that information with others to prevent future mistakes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q13 Information Integrity. (Please use a scale of 1 to 5 rate the following statement, 1 for least agree, 5 for strongly agree)

	Disagree	Somewhat disagree	Neither Agree nor Disagree	Somewhat agree	Agree
I only share and use information that I trust.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q14 Information Informality. (Please use a scale of 1 to 5 rate the following statement, 1 for least agree, 5 for strongly agree)

	Disagree	Somewhat disagree	Neither Agree nor Disagree	Somewhat agree	Agree
I prefer to use information from other people than information from professional organizations or publication.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q15 Information Control. (Please use a scale of 1 to 5 rate the following statement, 1 for least agree, 5 for strongly agree)

	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat agree	Agree
In my organization, information is presented to people to manage and monitor their performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q16 What is your revenue growth in the past 6 months?
Amount (in US dollars)
Percentage change over the previous 6 months

Q17 How much money (in US dollars amount) have you raised in the past 6 months from outside sources (e.g., venture capital, investors, loans, etc.)?

Q18 How many patents do you currently own or are pursuing?

Q19 Please rate the business performance of your company from 1 to 5 (1 is the least successful, 5 is the most).

	1	2	3	4	5
Business Performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q20 If you could add other information resources/services/assistance to enhance your business performance, what would you like to have?