Factors Contributing to Visible Performance in Saudi Technology Incubators

A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF

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by

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Certificate of Original Authorship

I, Muhammad Hatim Binsawad declare that this thesis, is submitted in fulfilment of the requirements for the award of Doctor of Philosophy PhD, in the School of Information Systems and Modeling/Faculty of Engineering and Information Technology at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise reference or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis. This document has not been submitted for qualifications at any other academic institution.

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List of Publications

The following research articles were produced to publish some impressions and outcomes from the work undertaken by the author during the course of this PhD research study

Referred Journal and Conference Papers

1. Binsawad, M., Sohaib, O. & Hawryszkiewycz, I.T. 2018, 'Factors Impacting Technology Business Incubator Performance', *International Journal of Innovation Management*, pp. 1950007-1-1950007-30. ***Journal***
2. Binsawad, M., Sohaib, O., Hawryszkiewycz, I. & Aleidi, A. 2018. 'Individual Creativity Towards Technology Business Incubator Performance'. In Proceedings of The 24th Americas Conference on Information Systems (AMCIS2018), AMCIS Publishing, New Orleans, Louisiana, United States, August 16-17. ISBN: 978-0-9966831-6-6. Ranked "A" ***conference***.
3. Phung, V.,Hawryszkiewycz, I., & Binsawad, M. (2018). Exploring How Environmental and Personal Factors Influence Knowledge Sharing Behavior Leads to Innovative Work Behavior. In N. Paspallis, M. Raspopoulos, C. Barry, M. Lang, H. Linger, & C. Schneider (Eds.), Advances in Information Systems Development: Methods, Tools and Management (Vol.26). Springer. ***Chapter.***
4. Binsawad, M., Sohaib, O., & Hawryszkiewycz, I. 2017, 'Knowledge-Sharing in Technology Business Incubator'. In the 26th Information Systems Development: Advances in Methods, Tools and Management (ISD2017 Proceedings). Larnaca, Cyprus: University of Central Lancashire, Cyprus, September 6-8. ISBN: 978-9963-2288-3-6. Ranked "A" ***conference***.
5. Phung, V.D., Hawryszkiewycz, I.T., Kang, K. & Binsawad, M. 2017, 'Applying the Fuzzy Analytic Network Process to Establish the Relative Importance of Knowledge Sharing Barriers', The 19th International Conference on Information and Knowledge Management, The World Academy of Science, Engineering and Technology, London, UK, March 14-15. Ranked "A" ***conference***.

6. Phung, V.D., Hawryszkiewycz, I.T. & Binsawad, M. 2017, 'Exploring How Environmental and Personal Factors Influence Knowledge Sharing Behaviour Leads to Innovative Work Behaviour in Vietnamese Higher Education Institutions'. In the 26th Information Systems Development: Advances in Methods, Tools and Management (ISD2017 Proceedings). Larnaca, Cyprus: University of Central Lancashire, Cyprus, September 6-8. Ranked "A" ***conference***.
7. Binsawad, M., Hawryszkiewicz I., & Kang, K. (2016), 'The Influence of the Knowledge-Sharing Process on Technology Business Incubator Performance in Saudi Arabia'. In the 25th Information Systems Development: Complexity in Information Systems Development (ISD2016 Proceedings). Katowice, Poland: University of Economics in Katowice. ISBN: 978-83-7875-307-0. Ranked "A" ***conference***.
8. Binsawad, M., Hawryszkiewycz , I & Kyeong, K. 2016, 'Saudi Technology Incubation: an Analysis and Indication of Gaps in Functioning'. In Proceedings of The 22nd Americas Conference on Information Systems (AMCIS2016), AMCIS Publishing, held in San Diego, California, United States, August 11-13. ISBN: 978-0-9966831-2-8. Ranked "A" ***conference***.
9. Hawryszkiewycz, I. and Binsawad, M. 2016, October, 'Classifying knowledge-sharing barriers by organizational structure in order to find ways to remove these barriers'. In Eighth International Conference on Knowledge and Systems Engineering (KSE). IEEE, Hanoi, Vietnam, pp. 73-8. Ranked "B" ***conference***
10. Binsawad, M.H., Hawryszkiewycz, I & Kyeong, K. 2015, 'The Influence of Creativity, Knowledge Sharing and Diffusion of Innovation Towards Technology Incubators Performance in Saudi Arabia'. In Proceedings of the 26st International Business Information Management Association Conference (IBIMA), IBIMA Publishing, Spain pp.11-12. 3157-3168. Ranked "B" ***conference***.

Abstract

In today's competitive global market, technology business incubators are considered the backbone of a region's economic development, involved in the creation of employment opportunities, boosting the local economy and commercializing, particularly as regard innovative technologies. In Saudi Arabia, incubators are working to develop innovative businesses with the potential to contribute to the nation's technological growth. The goal of Saudi incubators is to focus on technology innovations. These incubators contribute to knowledge-based programs that produce opportunities that will help transform the country into a knowledge-based society and, in turn, contribute to a knowledge-based economy. With the development of a knowledge-based economy, incubators are considered viable business entities to generate products arise from a veritable mix of innovation, knowledge and its management within the incubators. For the success and performance to ensure survival of an incubator, the transfer of tacit knowledge is very important. Universities play a key role in transferring tacit knowledge into explicit form. In the context of university-based technology incubators, the university facilitates knowledge flows to the incubator through academics and processes. Thus, incubators play a vital role as a catalyst for economic development by ongoing knowledge transfer.

This research explores the major factors influencing Saudi technology incubators' performance. It examines factors that include knowledge sharing, individual creativity and innovation diffusion. Based on existing theories and extensive related studies, the conceptual model of this study was conducted. This study adopts a mixed method approach (quantitative and qualitative) through two stages.

First, the quantitative approach was conducted to empirically investigate the factors' relationships in the proposed model through applying survey instrument. Second, the qualitative approach was applied in order to validate the quantitative results and present more insights into the identified factors' relations with the conceptual model.

The study shows that phase one (quantitative) of the research supports all the identified relations of the hypotheses of knowledge sharing organizational and individual factors, knowledge-sharing process (donation and collection), individual creativity and diffusion of innovation except H1b, H3a, H4a, H9 and H10 hypotheses that clarified as following:-

H1b- Management support positively impacts knowledge sharing collection

H3a- Rewards positively impacts knowledge sharing donation.

H4a- Interpersonal trust positively impacts knowledge sharing donation.

H9- Expertise positively impacts technology incubator performance.

H10- Creative thinking skills positively impact technology incubator performance.

The second phase (qualitative) of the research generated mixed findings. Most of qualitative phase findings endorse the quantitative results. On the other hand, some of these findings do not endorse the quantitative results, however they support the proposed hypotheses in the actual research. Finally, the study concludes and presents the current research and practices.

Glossary		
Abbreviation	Description	Definition
KSP	Knowledge-sharing process	The procedures of transferring (sending and receiving) knowledge (experience, skills etc.)
DON	Donation	Knowledge is shared by an individual 'donating' their own personal intellectual capital to others.
COL	Collection	An individual furthers their knowledge by requesting colleagues to share their intellectual capital.
MS	Management Support	This represents the extent to which senior management support knowledge sharing within the organization through facilitating the required resources and encouraging employees to share their knowledge with others.
ITS	Information Technology Support	Level to which facilitating knowledge sharing through information technology use.
RWD	Rewards	The degree to which a reward system to share any new and creative ideas and effectiveness knowledge sharing.
ITrsut	Interpersonal Trust	Co-workers having a good level of faith in each other in terms of intentions and behaviors.
ENS	Enjoyment in Sharing	Pleasure and joy in exchange of information among people.
SE	Self-Efficacy	The belief individuals hold in themselves regarding their competencies to organize and execute the course of action required necessary to achieve a particular level of performance.
DOI	Diffusion of Innovation	A theory explaining the way that new ideas or technology innovations spread.
ComX	Complexity	The degree to which an innovation is perceived as relatively difficult to understand and to use, that could be involved in the ability of users, technical skills conditions and technological requirements, etc.
Com	Compatibility	The extent to which innovation is considered as stable with current values.

RA	Relative Advantage	The potential advantage that could be achieved by users, if the innovation was applied
IM	Intrinsic Motivation	The passion and desire of someone to work on a specific task that is interesting, challenging and exciting for him.
Exp	Expertise	Expertise can be considered as skills of performing a specific task in the most effective and creative manner.
CTS	Creative Thinking Skills	The abilities or capabilities for innovative, cognitive and creative thoughts.
TIP	Technology Incubator Performance	The outcome of the incubators such as program growth and sustainability, tenant firm's survival and growth, contributions to sponsoring the university's mission and community-related impacts
TI	Technology Incubator	"The technology incubator is an entity where knowledge is transformed into innovative products and services"
EFA	Exploratory Factor Analysis	Factor analysis technique providing an appropriate number for each factor of the constructs of the proposed model.
CFA	Confirmatory Factor Analysis	Factor analysis type confirming identified structures of the factor as well as further strengthening the validation of every construct and its factors in social research.
KPI	Key Performance Indicator	A measurable entity that investigates how an organization achieves its business objectives in an efficient way.
R&D	Research and Development	Business activities investigated by an organization in order to develop innovations or procedures.

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CHAPTER 1: INTRODUCTION

This chapter discusses the study objective, which is to explore the influence of individual creativity, knowledge sharing and diffusion of innovation towards technology business incubator performance in Saudi Arabia. Understanding factors that contribute to the performance of the incubators has been a crucial process for Saudi government in order to boost up the local economic in Saudi Arabia (Al-Mubaraki, Al-Karaghouli & Busler 2010). The chapter starts by discussing the research background and research problem, presenting the purpose of the study including the aim and objectives. In addition, this chapter presents the research significance and research questions. Following that, an overview of research plan and thesis layout of this study are presented.

1.1 Research Background and Research Problem

The field of technology business incubation combines new ideas with existing resources and expertise in order to produce viable products and businesses, technology business incubator being the entity assisting and encouraging innovation. *"The technology incubator is an entity* where knowledge is transformed into innovative products and services" (Yee 2009). In the past ten years, there has been a trend in universities to be more proactive in their outreach activities, such as dissemination of knowledge-transfer from only within the academic community to the wider business community and other stakeholders (Robertson & Kitagawa 2011).

According to the Higher Ambitions: the Future of Universities in a Knowledge Economy 2009 policy framework, universities were signified as "…the most important mechanism we have for generating and preserving, disseminating and transforming knowledge into wider social and economic benefits".

Accessing university knowledge and transferring to the wider public is an extremely important factor for technology business incubators as university-based technology initiatives that enable knowledge flows into the incubator firms via the university. Working together with university researchers, incubators can influence the resources of a university to increase their performance. The university will ensure dissemination of the knowledge transfer to the university-based technology incubator through researchers. The knowledge transfer also takes place through partnerships between university-based incubators and industry leaders and here by creating a culture of entrepreneurship.

It is within this incubator that viable business entities and products arise from a veritable mix of innovation, knowledge and its management. The use of business incubators first appeared in the 1980s as an essential tool for assessing the performance of new business development and, in consequence, the growth of local economies (Cheng & Schaeffer 2011). However, there was a problem with the criterion adopted for such an assessment. There are several studies which have examined the effect of business incubation on the jobs creation in the existing literature concerning business incubation (Udell 1990), with incubatee development (Smilor 1987b) or incubatee graduation rates (Peters, Rice & Sundararajan 2004). University linked incubators, non-profit incubators and for-profit incubators all among the different types of incubators studied (Peters et al. 2004).

There has been a significant increase in recent years in the demand for rigorous and workable assessment frameworks for business incubators (McMullan, Chrisman & Vesper 2001). Unfortunately, the assessment of incubator performance has suffered due to limitations in methods, theories and empirical data adopted (Yu & Nijkamp 2009); this hampers the drawing of meaningful inferences from the current research on

incubator performance. However, as there are many different means of measuring incubator performance, there is not a clear overview of the performance of incubators in the literature available. Thus, there is no agreement between scholars on the measurement of incubator performance (Phan, Siegel & Wright 2005).

Saudi Arabia has also the joined the global community in developing technology incubators, although these are still at the preliminary stages of introducing technology and science parks mostly. It has been noted in research that in the developing countries, including the Saudi Arabia, technology incubators have not been able to come up to their expectations. Compared to the planned objectives, they are not as yet, however, contributing to the development of local economy, the transfer of technology, creation of new enterprises and increase of job creation (Al-Mubaraki, Al-Karaghouli & Busler 2010; Mian, Lamine & Fayolle 2016).

According to the director of the Badir program for technological incubators at King Abdulaziz City for Science and Technology (KACST) Saudi "There is a lack of knowledge on pioneer initiatives and how to be a pioneer – an issue we are working on with educational, training and organizational bodies to tackle" (Arab news 2012). Although, individual creativity and the diffusion of innovation are crucial parameters that evaluate the success of a technology business incubator, in Saudi Arabia, the major lack arises is the lack of knowledge creation and transfer, starting from its generation till the end of the knowledge management process while it keeps innovation and creativity among its top priorities.

A review of the literature indicates that technology business incubation is in its developmental stages in Saudi Arabia (Binsawad, Sohaib & Hawryszkiewycz 2019; Khorsheed, Alhargan & Qasim 2012). There are private-sector organizations working as

technology business incubators in Riyadh and Jeddah, especially, which offer fee-based facilities to aspiring entrepreneurs. However, Saudi technology business incubators work from the platform of universities and not as independent units, thus the services provided by these incubators are based on limited funding and also a short range of services to clients (Salem 2014a). There is need for a clear understanding of what their goals should be and how these should be achieved so that targeted assistance can be provided to budding entrepreneurs, who can then contribute substantially to the economic development of Saudi. With a similar goal in mind, Saudi Arabia is also seeing the setting up of technology incubators and parks by some private companies and academic institutions. The research aims to fill the gap in the existing research that is needed in Saudi Arabia context to empower the national incubation initiative.

Most of the Arab world faces deficiencies in their infrastructure as also in their products and services like goods, labor and their financial markets and slow pace of innovations and technological up-gradation; this is brought out in the 2010-2011 World Economics Forum's Global Competitiveness report (Schwab & Sala-i-Martin 2010). Better resources and services enable entrepreneurs and startups to achieve higher growth and development facilitated by business incubation. There is no sound foundation theoretically to the available knowledge of the process of business incubation (Tamasy 2007). Therefore, the inferences concerning business incubations and the effect they have on startups are not consolidated or clear (Chan & Lau 2005). The aim of business is to support successful startups. That knowledge is the vital determining factor for developing successful startups is a widely acknowledged fact. A new venture's performance is dependent on the knowledge that it is able to acquire as per many academic scholars (Studdard 2006; West & Noel 2009; Wiklund & Shepherd 2003).

With the development of a knowledge-based economy, technology and innovations are

considered as vital elements of performance (Rooney, Hearn & Kastelle 2012). The ability of a number of business organizations which make up a business economy are dependent for their success on their ability to innovate; lack of such skills deprives them of a competitive edge and restricts their growth in businesses of high wage and profits (Grossman & Helpman 1993; Taylor, Grossman & Helpman 1993). Increase of output, edge in competition and wealth of a nation are controlled by innovation (Carlson & Wilmot 2006). Based on the literature on business incubation it is segregated into two areas, i.e. industry-based and academic-based. Treating incubation as an agency that emphasizes on the correlation between innovation and knowledge, academic scholars have focused on specific elements in the process of incubation while studying its evolution (Ascigil & Magner 2009; Hughes, Ireland & Morgan 2007; Tötterman & Sten 2005). Being a property-based enterprise providing services, both tangible and otherwise, technology incubators are specific business incubators to entrepreneurs, tech-based firms and other affiliates of universities and large firms to help arm them with tools for survival, wealth-generation and job creation. Therefore, most of the technology indicators are associated with research institutions like universities, tech-parks or corporate/industries with R & D resources in both private and public sector.

A firm's competitive edge is greatly empowered by the firm's knowledge base (Gupta & Govindarajan 2000b). Knowledge provides the foundation for the development of other vital resources (West & Noel 2009). Enhanced innovation and economic development can potentially result from a clear understanding of the role performed by incubators in the development of startups; assembling a resource base is one of the main challenges in creating new ventures. Among the various resources required by new ventures to achieve the successful performance and survival of a venture, intangible resources like knowledge are very important. (Brush, Greene & Hart 2001).

Many smaller business entities form a nation's business sector whose innovating abilities govern its future success; this capability empowers them with a mechanism to remain competitive and maintain growth in industries with high wages and profits (Taylor, Grossman & Helpman 1993). In the modern economy, research leads to new knowledge and its creation on which innovation depends; generation of economic activity and enhancement of wealth are a direct result of research-based innovation making it a coveted asset (Parto 2008). The generation and management of knowledge is seeing rapid changes and frequent innovations on account of the higher education institutions of developing nations entering the fray with the specific aim of transferring the emerging innovations to the private sector through the incubators and technology parks. The commercialization efforts of the universities are encouraged by technology incubators, which are provided an opportunity to utilize universities as a source of technology and help their tenant firms.

The impact that the technology business incubators have on the sharing of knowledge process, individual creativity and innovation by the incubatees will be the focus of this study; this will, thus examine the influence on the incubator performance as a result of the effects of the factors acquired.

1.2 Purpose of the Study

The purpose of this study has twofold aims. First, it aims to examine the impact of knowledge-sharing process of incubatees on technology business incubator performance in Saudi context. Second, it examines how individual creativity and innovation acquired from the business incubator are related to technology business performance. The aims of the study are clearly clarified in the following objectives: -

- To identify the critical elements of the knowledge-sharing process based on previous studies in order to provide theoretical foundation for the frame work
- To investigate the impact of the knowledge-sharing process (donation and collection) on Saudi Arabian technology business incubator performance.
- To investigate the impact of individual level creativity on Saudi Arabian technology business incubator performance.
- To investigate the impact of diffusion of innovation on Saudi Arabian technology business incubator performance.
- To develop a conceptual model for Saudi Arabian technology business incubator.
- To empirically validate the proposed model through applying survey instrument and case studies.

1.3 Research Questions

The section presents the research questions of this study. These research questions were formulated in order to investigate the research gaps that are relevant to the current research study.

1- What are the factors influencing the knowledge-sharing process (donation and collection) in technology business incubator Saudi context?

a. How do knowledge-sharing process organizational factors (management support, IT support and motivational rewards) influence the knowledge-sharing process (donation and collection) in technology business incubator in Saudi context?

b. How do the knowledge-sharing process individual factors (interpersonal trust, enjoyment in sharing and self-efficacy) influence the knowledge-sharing process

(donation and collection) in technology business incubator in the Saudi context?

2- How does the knowledge-sharing process (donation and collection) influence technology business incubators' performances in the Saudi context?
3- How do individual creativity factors of incubates influence technology business incubators' performances in the Saudi context?
4- How does the diffusion of innovation factors of incubatees influence technology business incubators' performance in the Saudi context?

1.4 Significance of the Study

The Saudi incubators are designed for technology innovations, and are primarily established to serve as knowledge-based programs designed to produce opportunities leading to transition the country to a knowledge-based society and, as such, contribute to a knowledge-based economy(Salem 2014a). This research is unique in that it examines technology business incubator performance by studying the incubation process, such as the knowledge resources, individual creativity and diffusion of innovation, all of which are important in the developmental process of new ventures. This is the first research that has investigated the technology business incubator in Saudi Arabia.

This study attempts to fill this gap by establishing a viable framework capable of assessing and managing technology business incubators operating in the Saudi Arabia environment Additionally, the current study will statistically examine the effects of knowledge sharing practices, individual creativity and innovation on technology business incubators in Saudi Arabia.

- The key findings of this study will benefit the Saudi Arabian technology business incubators in order to better formulate the incubation process.

- This study will propose guidelines to technology business incubators in general and for Saudi Arabia in particular for improving their performance.

1.5 Scope of the Study

This study employed mixed methods approach to collect the data research through survey instrument and case studies technique in technology business incubators in Saudi Arabia. The data were collected from incubates and key positions in the incubators. The collected data from both surveys and case studies are limited to technology business incubators in Saudi Arabia. The limitations as to how this study was conducted are clarified as following:

- An intensive review of the knowledge-sharing process literature based on the understanding of researchers in a Saudi Arabian context led to defining both organizational factors senior management motivation, IT support and motivational rewards) and individual factors (interpersonal trust, enjoyment in sharing and self-efficacy). This is discussed in detail in Chapter 2 and 3.
- This research relies on diffusion of innovation (DOI) and individual creativity concepts as its theoretical foundation. This is discussed in detail in Chapter 2 and 3.
- This research did not consider the national culture factor in collecting its data; data were collected from Saudi and non-Saudi participants in selected technology business incubators in Saudi Arabia.

1.6 Overview of Research Plan

This section presents an overview of the conducted research activities of this study. The methodology of the study is given in greater detail in Chapter 4.

1.6.1 Research Background and Research Problem

One of the most essential phases in the research life cycle is the literature review phase, which is a continuing process. The further research proceeds, the more focused a literature review becomes. An intensive literature review was involved in the first stage of this study. The literature review involved the area of this research including knowledge sharing process, individual creativity, diffusion of innovation, incubators and related theories. In this stage, the research borders were stated clearly in order to investigate the influence of knowledge sharing, individual creativity and the diffusion of innovation regarding technology business incubators' performance.

After conducting the literature review about the previous studies, it was obvious that there were gaps in the knowledge. This means that is no research has been conducted to discuss the influence of knowledge sharing, individual creativity and the diffusion of innovation regarding technology business incubators' performance.

1.6.2 The Development of the Research's Theoretical Model

Having clarified the research gap, the research questions and the hypotheses of the current study were developed. This stage also includes examining previous validated studies and models related to the field of the knowledge-sharing process, individual creativity and diffusion of innovation. Following this, in order to investigate the devised research question, a conceptual model was conducted.

1.6.3 Research Method

Mixed methods approach was applied for this study. This approach employed both quantitative and qualitative methods in order to answer the research questions and investigate the hypotheses. This study incorporates two stages. Stage one of the study was applied through a quantitative method; a survey instrument was utilized to collect the data from incubatees in technology business incubators in Saudi Arabia about their influencing factors for use in the research framework. Stage two of the study employed a qualitative research method; multi-case studies were used to collect the data from key positions in the incubators through semi-structured interviews. The results of this stages were then carried out to validate the quantitative results.

Formerly, the survey was conducted by developing a validated questionnaire. Before the data collection process, ethics approval was attained from the Human Research Ethics committee of University of Technology Sydney.

1.6.4 Data Analysis

After the data had been received from the respondents, they were analyzed using statistical techniques like The first approach is exploratory factor analysis (EFA) (Gerbing & Anderson 1988) and the second approach is confirmatory factor analysis (CFA) (Hair et al. 2006). The analysis was implemented in two stages; the first stage being discovering that preparation of the data by compiling the descriptive data. This step is significant in order to progress to the next step, multivariate data analysis. This investigation consisted of respondents' profiles' research and data screening. After that, discrepancy-based structural equation modeling (SEM) was applied for evaluating and discovering the significance of the constructs relations of the study model. Partial Least Squares (PLS) SmartPLS version 3 (Hair, Ringle & Sarstedt 2011; Henseler, Ringle &

Sinkovics 2009a; Sarstedt et al. 2014) structural equation modeling (SEM) technique was conducted for data analysis for to examining the relations between the various factors of the model presented in this research. Each construct/variable was analyzed by correlation performing both tests of exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) for determining the reliability and the best structure of factor. This performed correlation led to the confirmation and development of the valid constructs of the model.

1.6.5 Validation of the Data

An explanatory approach was adopted in the study in order to develop the conceptual model from the evaluation stage. For data collection technique, a case studies approach of two Saudi Arabian technology business incubators was conducted through key staff positions in the selected incubators. Semi-structured interviews approach with the key staff positions in the incubators was applied in order to validate the quantitative results. After conducting the interviews, as an analysis process, direct interpretation was conducted.

1.6.6 Discussion and Recommendations

Finally, the findings of this study were addressed by interpreting all hypotheses as regard the research questions. The study provides the theoretical and practical implications and a convincing conclusion. The adopted research design of this study is shown in Figure 1.1

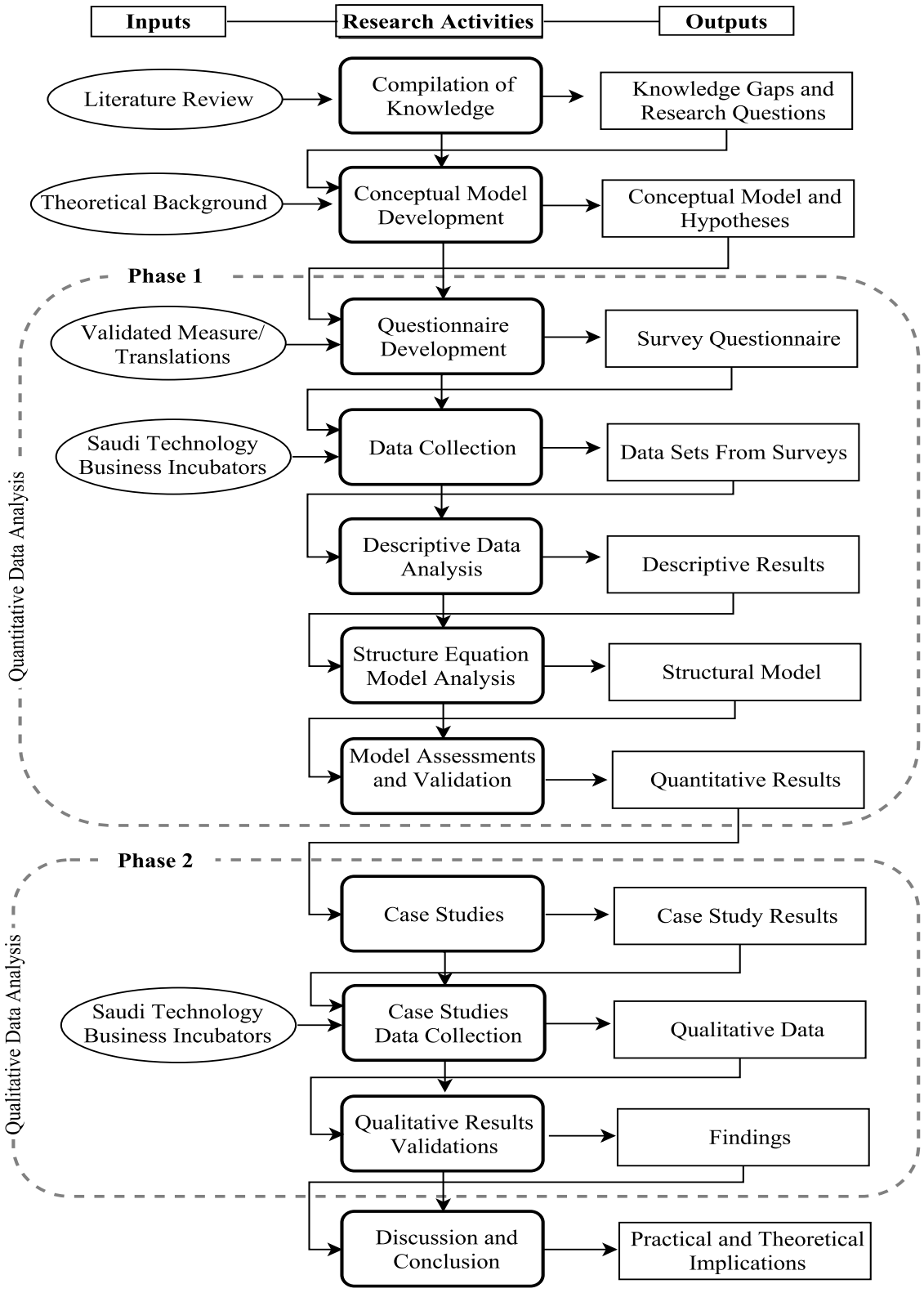

Figure 1.1: Research Design

1.7 Thesis Layout

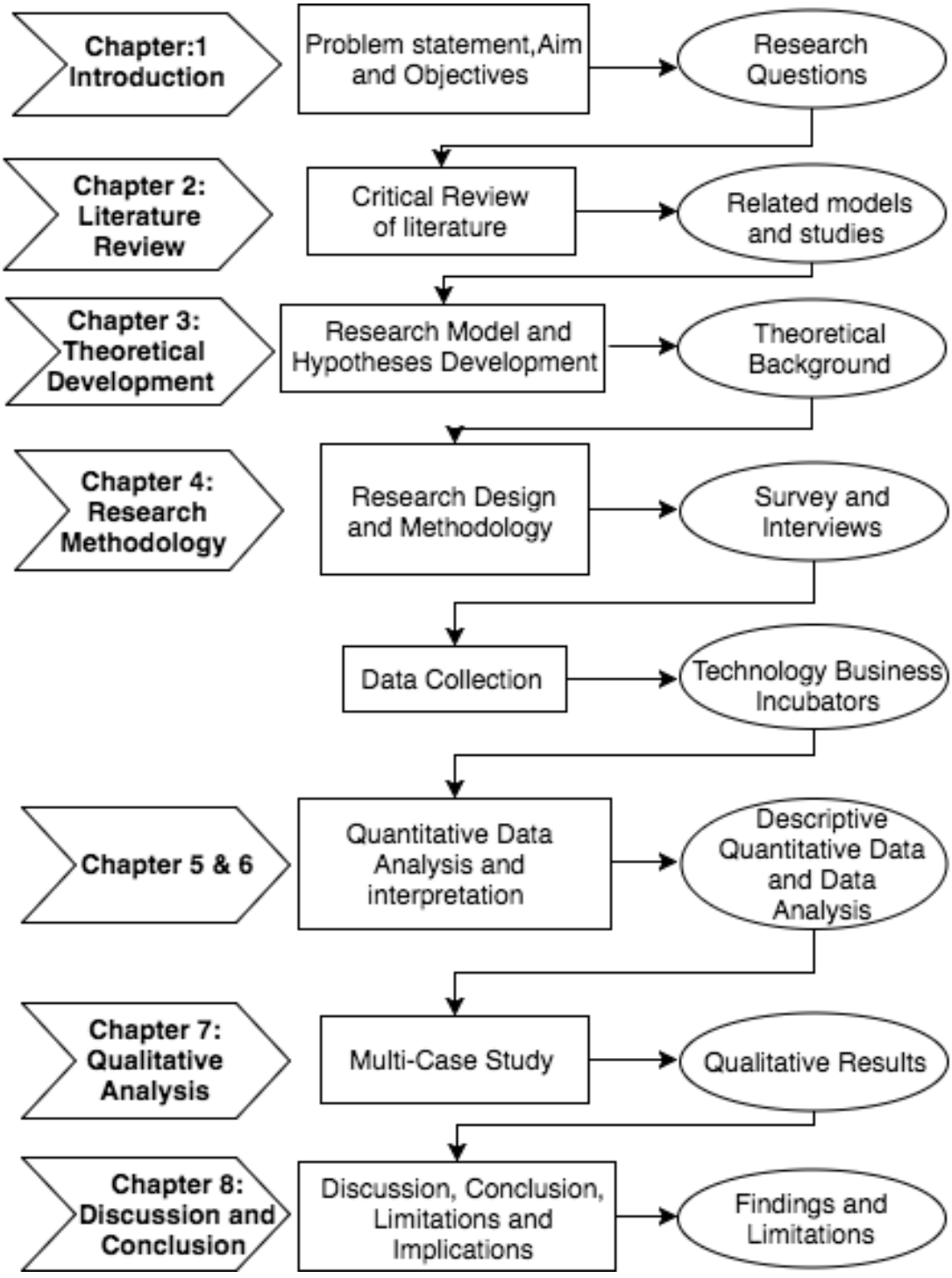

Figure 1.2: Thesis Structure

This thesis includes eight chapters. Chapter 1 (introduction) presents the research problem and the research background, purpose of the study, identified research questions and significance of the study. This chapter also presents an overview of the research plan.

Chapter 2 presents an intensive literature review that provides rich background information about incubators generally and technology business incubators in the Saudi Arabia context in particular. This chapter also provides an overview of incubators in Saudi Arabia Finally, the chapter investigates various factors influencing technology business incubators' performance including knowledge sharing, individual creativity and diffusion of innovation.

Chapter 3 addresses the conceptual model development for this study. The theoretical background of the conceptual model is discussed in depth, including related theories and studies on incubators, knowledge sharing, individual creativity and diffusion of innovation. In this chapter, the study also discusses various impacting factors (individual and organizational) of the knowledge-sharing process. Finally, the hypotheses of the research are developed.

Chapter 4 provides the research methodology used for the current study. This chapter explains the adopted research design for the study, then the methodology stages are identified. Stage 1 of the study employs quantitative approach through distributed survey, while stage 2 of the study employs qualitative approach consisting of case studies analysis.

Chapter 5 presents the findings of the descriptive analysis of data collected from incubatees in Saudi Arabian technology business incubators. First, the details about the questionnaire are presented followed by participant's profile. After that, statistical

analysis for descriptive data and verifying the characteristics of data are provided. In addition, the chapter includes standard deviations and standard errors of the mean, missing data and assessment of normality, and outlier screening.

Chapter 6 shows data resulted from measurement scale analysis through measurement model's validity assessments. These assessments utilized two analysis approaches. The first approach is exploratory factor analysis (EFA) providing an appropriate number for each factor of the constructs of the model. The second approach is confirmatory factor analysis (CFA), confirming the identified structures of the factors as well as further strengthening the validation of every construct and its factors. Also, structural equation modeling (SEM) statistical analysis technique was conducted for determining the statistical significance of the relation between model constructs and rejected or accepted hypothesis identified in Chapter 3.

Chapter 7 validates the quantitative results by conducing the qualitative data analysis that support the outcomes to the actual phenomena. In order to achieve that, explanatory case study approach of Saudi Arabian technology business incubators was conducted. This chapter also includes the extracted analysis from the conducted interviews with key positions in technology business incubators to validate the research hypothesis.

Finally, Chapter 8 summarizes the findings of this research, including discussion of the contributions resulted by this study regarding the existing body of knowledge as well as the implications of the research findings for Saudi Arabian technology business incubators. This chapter suggests future research recommendations and identifies the study limitations. Finally, the reference list and Appendices A-C are presented.

CHAPTER 2: LITERATURE REVIEW

The main point of this chapter is providing a solid foundation for the research framework discussed in Chapter 3 by reviewing related studies. First, this chapter presents rich background information about incubators generally and incubators in the Saudi Arabian context specifically. Then, the purposed numerous influencing factors that contribute to technology business incubators' performance are discussed in detail.

2.1National Transformation Program 2020

National Transformation Program 2020 is the solid foundation for building the institutional capacity and capabilities required to accomplish the motivated objectives of "Saudi Arabia's Vision 2030". The program was lunched in 2016 through 24 government forms functioning in the economic and development sectors in the first year of the program. It is worth to mention that the strategic objectives of the program are related to provisional goals for the year 2020 (*National Transformation Program 2020*).

The program utilizes innovative techniques in order to classify the upcoming challenges including capturing opportunities, adopting applicable planning instruments, triggering the responsibility of the private sector, assessing performances and establishing implementation (*National Transformation Program 2020*).

2.2 Saudi Arabia's Vision 2030

Saudi Visions 2030 is a program and plan which defines mechanisms and procedures which will help in shift in the paradigm from Saudi Arabia's reliance on oil for its existence and strength. It also defines new mechanisms for economic growth. Lastly, it targets to develop and flourish public sector services like education, tourism, health, etc.

This plan is designed over specific goals and objectives which include different activities mainly targeting non-oil industry trade and initiate cost-effective solutions in terms of investments and economic incentives. It was announced in April 2016 by Crown Prince Muhammad Bin Salman and was developed by the Council of Economic and Development Affairs. This vision has three important pillars and objectives including achievement of a vibrant society, a thriving economy and ambitious nation. This demands focus towards people and their religious faith, diversification of the economy by creating new job opportunities and show concerns about accountability, corruption and transparency (Vision 2030 2018).

The growth and prosperity of a country is defined by its economic system, the fine blend of labor market, its sustainability, inclination towards development of renewable energy sources and the educational setup executed (Alshuwaikhat & Mohammed 2017; Jurgenson, Bayyari & Parker 2016). Development of the socioeconomic programs will improve quality of life by addressing human demands and needs. Establishment of strong private sector also stands as a big challenge. Saudi job market is much more public sector driven as compared to private sector due to ease to hire and fire in later case. Many initiatives have been taken to achieve the goals of Vision 2030 like King Abdullah Economic City (KAEC). It has been developed to target economic growth and generate job opportunities for people in the desert kingdom. KAEC will target business centers and educational hubs which will drive economics from traditional social values to elite's priorities (Kinninmont & Kinninmont 2017).

2.3 Saudi Arabia Vision 2030 and Knowledge-Based Economy

A knowledge-based economy defines the development of country's economy based on knowledge and educational initiatives and programs. Saudi Arabia has focused greatly

on its economic development and KAEC has been one such initiative to support the goals in Vision 2030 (Khorsheed 2015). Saudi Arabia is a member of G20 (Group of Twenty, set of countries which come together at the same platform to solve today's pressing problems) and is the largest exporter of oil in the world which also becomes its basis for government revenue (Nurunnabi 2017). In order to target a knowledge-based economy for Saudi Arabia's Vision 2030, some key factors have been identified to be kept in spotlight and consideration. These are innovation, economy, human capital, information and communication technologies, employment and education (Nurunnabi 2017). Some of these are of concern, due to challenges like empowerment of women in education and professional environments. The trend of women joining the professional environments has shown significant increase in the last few decades (Elmulthum & Elsayed 2017). The Saudi government can diminish this stress by diversification of economy by addressing the knowledge-based economy (Al-Filali & Gallarotti 2012; Nurunnabi 2017).

The fine transition to a knowledge-based economy has been targeted at the government level in the past decade to achieve vibrant and stable economy. Vision 2030 targets formation of a society which is digitally strong in terms of economy. Like any knowledge-based economy, the following objectives have to be met in Vision 2030 also (Al-Filali & Gallarotti 2012; Altbach 2013):

- Education and training
- Information infrastructure
- Economic initiative and Institutional regime
- Innovation systems

Saudi Arabia is a strong country to shift to a knowledge-based economy due to its significant in terms of its political and social stance. Based on the Saudi Arabia's

knowledge economy index at 5.93 derived by the World Bank in 2012, it stands as 50th country in the world suitable for this shift (Al-Filali & Gallarotti 2012). In this transition towards knowledge-based economy, appreciation of the role and participation of women stands extremely critical. Also, their attitudes towards science, technology and engineering is important (Aswad, Vidican & Samulewicz 2011).

2.4 Defining Incubators

The importance of the incubator functions has been explored by multiple researchers (Al-Mubaraki 2008; Culp 1996; Lumpkin & Ireland 1988; Merrifield 1987). In the early 1980s, some US higher-education institutions underwent a transformation of broadening their traditional mission of research, education and public service by incorporating active participation towards their particular regions' economic development (Mian 1997). Many universities in the US, adopted a more entrepreneurial role by directly involving themselves in development of new innovative businesses. This proactive role of universities while being motivated by the will to be economically-contributive for their country, originated from the desire to develop collaboration with companies so as to reap the benefits of commercializing the university's research (Matkin 1990). In order to materialize their aim, establishments called the "technology business incubators" were set-up all across university campuses. This concept aimed to offer the potential of linking talent with technology, capital and appropriate knowledge to support entrepreneurial talent, thus accelerating the development of new technology-based firms and commercializing locally-developed technology (Smilor 1987c).

The revolution regarding business and technology promotion was inspired by the already established business incubators since 1942, when a company named Student Agencies Inc. in Ithaca had started to incubate and support student businesses (Phillips

2002). Later, in 1946, American Research Development (ARD) established the first-ever incubator to work outside of the student-community, run by the alumni of MIT. The first formal business incubator in the US started to function in 1959 under the patronage of Joseph Mancuso at Batavia Industrial Center in Batavia, New York (Lewis, Harper-Anderson & Molnar 2011). Since then, the concept of business incubators has grown to work outside of the higher education institutes to gain a global recognition. The growth of universities, non-profit groups, and venture capitalists as responsible parties to set up business incubators gained acceleration from the 1970s to the 1980s (Rouse 2005).

Now, in the world of business, the term, "incubator," is used to refer to an enterprise that is set up in order to provide office space, equipment, financial capital, and assistance of learned mentors to start-up businesses (Rouse 2005). By definition, incubator is an investment and support program, whereby entrepreneurs starting business over the internet are given management advice, access to finance, and technical assistance by a network of investors (Lin et al. 2012). As Corsi & Di Berardino (2014) explained, the incubator is essentially an example of business ingenuity. Incubators in the form of business incubators, provide a wide range of services to their clients (Figure 2.1). Thus, they are formally termed "business incubators" and defined as firms that act as support for the new and developing firms by providing them physical facilities and a large range of business services in order to help them make full use of the opportunities of survival and development at the time of start-up (Lin et al. 2012).

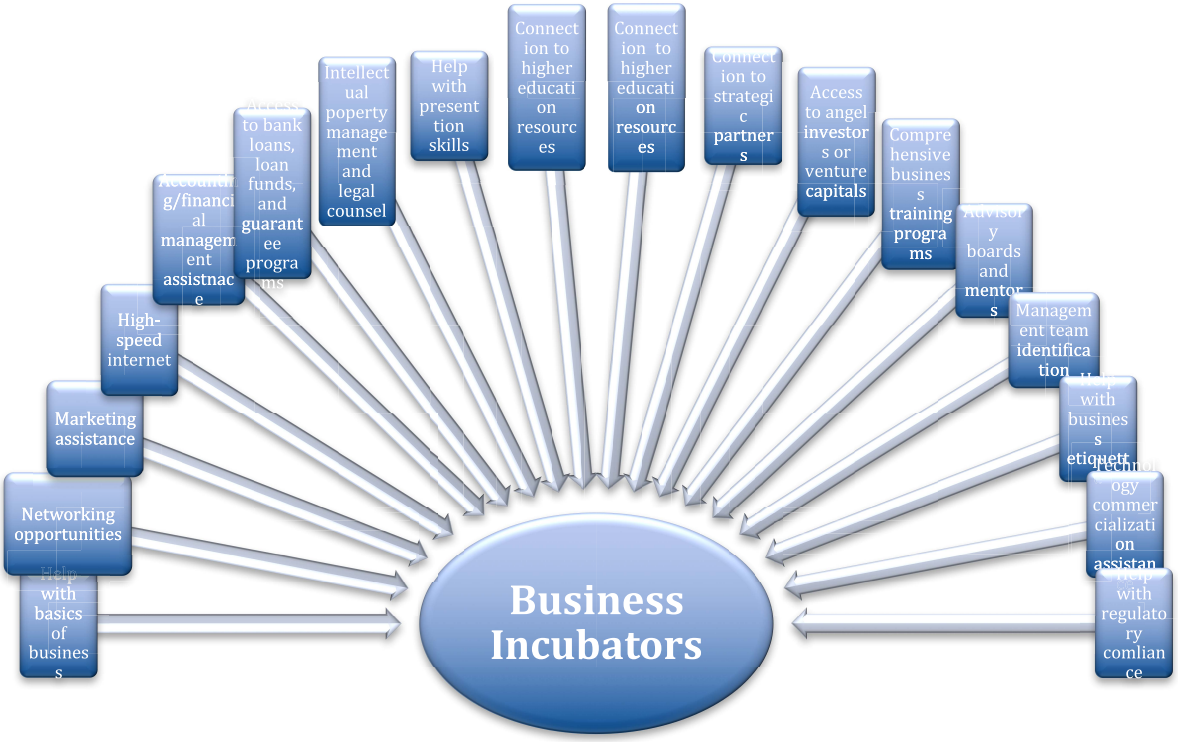

Figure 2.1: Services Provided by Business Incubators (Willson 2012)

2.5 Classifying Incubators

Barbero et al. (2014, p. 152) claimed that "not all incubators are equal and that there are different types with significant differences". Incubators are categorized into different types according to which services are delivered, their organizational structure and the types of clients served (Greene & Butler 1996). Incubators were introduced as a highly adaptable concept, hence with every new goal of catering to a diverse regional economy, they provided careers to the youth, enhanced wealth of local regions, and transferred research and technology from universities and other organizations to the mainstream. In any case, the clients being served by incubators are at the frontline in the development of innovative technologies, product creation and providing services designed to enhance the quality of life in communities all across the globe (Salem 2014a).

Although technology incubators are considered a type of business incubators (Lewis, Harper-Anderson & Molnar 2011), here the types of incubators are defined and elaborated on the basis of their very specific aims and means of achieving them. The major types of incubators in literature are thus business incubators and technology incubators, which are being discussed briefly below:

2.4.1 Business Incubators

Business incubators are designed to develop and stimulate general businesses for specific economic objectives, such as industrial restructuring and revenue generation as well as beneficial utilization of available resources (Bøllingtoft & Ulhøi 2005). They are meant to promote continuous national as well as regional, economic, and industrial growth, especially through the provision of employment. Business incubators work by combining diverse support elements for small enterprises in one affordable package (Bøllingtoft & Ulhøi 2005). The special niche in which business incubators work is to nurture the early stage of any proposed business and to support growth-oriented ventures. It provides focused assistance within a particular environment, supporting innovation and entrepreneurship. Business incubators are further categorized as (i) general/mixed use incubators and (ii) economic development incubators, which are briefly discussed below:

2.4.1.1 General/Mixed Use Incubators

Mixed/general-use incubators are established with the goal of promoting continuous industrial and economic growth in the region that they belong to through overall business development (Co-operation & Development 1997a). These incubators may include not only knowledge-intensive firms, but also low-technology firms working in services and light-manufacturing. A major focal point of these incubators is to provide

support by enabling access to local/regional sources of technical, managerial, marketing and financial resources.

2.4.1.2 Economic Development Incubators

The main aim of economic development incubators is to stimulate and promote specific economic objectives in a region, such as creation of employment opportunities as well as industrial restructuring (Salem 2014a). These incubators help to create new firms and also nurture the existing ones in order to fulfill the same purpose, i.e., create jobs. This happens often as a result of local government initiatives (Hsieh et al. 2014). In some countries, this goal may focus on specific groups, such as youth, the long-term unemployed, women and minorities.

2.4.2 Technology Incubators

Technology incubators are the incubators which aim to bolster the technology development stage of enterprises and new businesses being promoted by business incubators (Smilor 1987a). That is why they are often categorized as a subtype or a variant of the latter. The primary objectives, which gives them an individual identity is their more specific role in promoting technology-based enterprises and to help in the completion of technologies under development. Technology incubators are usually present near research and development institutes, universities, and science technology parks (Barbero et al. 2014).

Technology incubators are unique in fostering institutionalized links and collaboration with sources of knowledge and innovation (Hu 2008; Hu, Chang & Chen 2015). These may include universities, technology transfer agencies, research centers, national laboratories, and the skilled personnel involved in research and development (Hsieh et al. 2014). The general modes of working of technology incubators is given in Figure 2.2

Technology incubators encourage a transfer of technology and its diffusion by encouraging researchers and academicians to engage in entrepreneurship (Mian 1996). Technology incubators are further categorized into different types out of which the major ones are, (i) technology innovation centers and (ii) technology business incubators, (iii) science/technology parks.

The concept of technology incubation centers is not confined to one part of the world. Rather, technology incubation centers are given different names in various parts of the world, even though they all technically refer to the same thing. In the United Kingdom, for instance, they are more known as Science Parks while in France, they are called Technopolis (Mian 2016).

Different technological incubators have varying roles, financial sponsors, and goals. In general, however, they are commonly designed for building the economy, encouraging the proliferation of research output, and motivating innovation (Khorsheed, Al-Fawzan & Al-Hargan 2014; Mahmood, Jianfeng, Jamil, Munir, Lu, et al. 2015; Özdemir & Şehitoğlu 2013). Apart from being managed open spaces, technology incubation centers offer training, technical and business consultation services, financial services, as well as an environment conducive for the growth and nurturing of young people. In most of the technology incubation centers, experts are employed to oversee the general operations within the incubation and at the same time, determine what startup companies can take part in the incubator (Khorsheed, Al-Fawzan & Al-Hargan 2014).

Increasingly, technology incubation centers are perceived as practical tools for entrepreneurial activities. In the modern business world, traditional business operations are being replaced by contemporary methods, the majority of them technologically dominated. In the recent decades, technology has become a game changer in both manufacturing and service sectors (Lundqvist 2014; Phan & Lamine

2016; Rubin, Aas & Stead 2015). The concept is widely accepted and embraced by small and medium enterprises to spur their growth (Cheng et al. 2014; Hong & Lu 2016; Williams & Tsiteladze 2016).

In Pakistan for instance, there is a great disparity between the research sector and the business fields in mining new ideas (Mahmood et al. 2016). The service and manufacturing sectors are not as keen as they should be in taking up new concepts, which has negative effects on the economy. For the economy to experience growth and development, the need for constant new ideas and technologies cannot be exaggerated enough. This is why technology incubation centers in Pakistan play a great role (Mahmood et al. 2016).

In Poland, technology incubation centers also play a great role. These centers provide business support and allow organizational clients and experts to exchange technological knowledge (Lis & Romanowska 2016; Łobejko & Sosnowska 2015; Wójcik-Karpacz & Mazurkiewicz 2015). The centers' main objective is to enhance the innovative character of Poland and execute knowledge commercialization effectively. With technological incubation centers, entrepreneurs are able to get the business support they need to grow.

In Turkey, the concept is quite different because it is more of collaboration framework with universities that was started in the 1980s. The technoparks are under the regulation and care of the Ministry of Industry and Trade. Like the other technology incubation centers in different countries, however, they also play a great role in Turkey (Guceri-Ucar & Koch 2013, 2016; Sungur 2015).

The technoparks also contribute to economic growth by promoting and encouraging foreign direct investment, as other countries see the nation's innovations (Díez-Vial & Fernández-Olmos 2015). In 2001, all the technoparks have to receive a legal status with

the Law of Technology Development Zones (Díez-Vial & Fernández-Olmos 2015; Mubarak AL-Mubaraki & Busler 2014; Xiao & North 2017). In Nigeria, the concept emerged in the 1990s and served as the foundation or basis for developing sustainable entrepreneurial skills for the comity (Adelowo et al. 2015; Naisa & Usman 2016; Obaji, Senin & Olugu 2016). Technology-based startups benefitted greatly. Through the social and economic development processes triggered by the technology incubation centers in the nation, the startups were stimulated to nurture and implement technology-based business ideas, propelling them into success. The centers are instrumental in boosting the startups' business strategies and ideas (Adelowo et al. 2015; Naisa & Usman 2016; Obaji, Senin & Olugu 2016).

These different countries are evidence that the technology incubation centers concept is meant ultimately to boost the growth and returns to the country (Parker et al. 2015; Wonglimpiyarat 2014). Returns include job creation and employment opportunities, technology transfer, greater foreign currencies and localization, particularly the substitution of imports with locally produced and manufacture red goods. All of these can speed up a country's industrialization process (Wagner 2005). With these benefits, governments are encouraged to allocate a significant amount of budget for technology incubation centers (Parker et al. 2015; Wonglimpiyarat 2014).

2.4.3 Technology Innovation Centres

This type of technology incubator, as the name indicates, conducts research and development as well as brings innovation in the technology required by the industry (Agnete Alsos, Hytti & Ljunggren 2011). Technology innovation centers cater industries, which aim to cooperatively invest resources in to the work being done by universities or research organizations and also wish to achieve commercialization through the help of business enterprises or public institutes. Basically, technology

innovation centers share the aims and objectives of Technology Parks and (if only research and development stage is considered) fully-fledge technology incubators (Löfsten & Lindelöf 2002).

2.4.4 Technology Business Incubators

This type of technology incubators has arisen as an endeavor of public research institutes, universities, the local government and private institutions to promote and strengthen new technology-intensive enterprises (Co-operation & Development 1997a). Technology business incubators have a focus group consisting of innovative, largely technology-oriented and knowledge-intensive service sector enterprises. Here, interactions with the academic community provide the most significant portion of the incubation process.

2.4.5 Science/Technology Parks

This is a type of technology incubator is commonly managed by professional specialists with the main aim being to enhance public wealth by promoting a culture of innovation and the affordability of the businesses it supports (Rowe 2005). In order to meet these objectives, a Science Park serves to encourage and manage the flow of knowledge and technology between universities, R&D bodies, companies and various markets, whereby incubation and its incidental processes expedite the creation and growth of innovation-based companies.

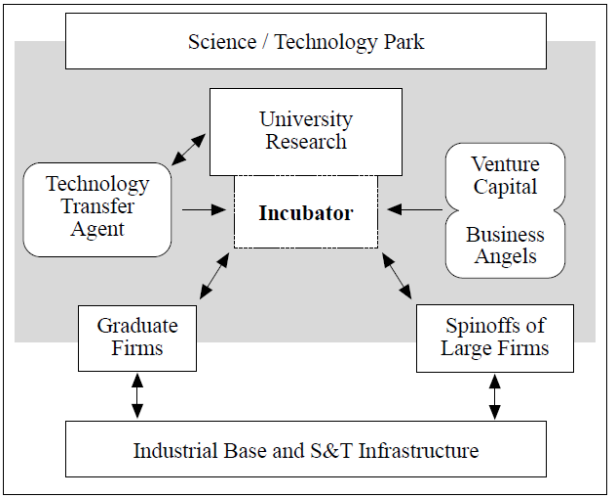

Figure 2.2: How Technology Incubators Work (Co-operation & Development 1997)

2.5 Incubators in Saudi Arabia

In January 2008, BADIR-ICT became the first technology incubator to be established in Saudi Arabia (Al-Mubaraki, Al-Karaghouli & Busler 2010). Being the first incubator to become operational within a short time, this incubator started to accept its initial projects while working as a part of the National Badir Technology Incubator Initiative of Saudi Arabia's national research institute at King Abdul Aziz City for Science and Technology. The BADIR-ICT works with a simple objective, namely to focus on the best incubation finance practice, gathering clients, and developing relationships with clients. One may question – keeping in mind the above discussion – that whether these can lead to the primary goals of technology incubation mentioned above with their focus on developing and sponsoring new clientele and spending investments.

Saudi Arabia allocated 8.6 billion dollars on research and development as a part of its 20-year National Science and Technology Plan (Shalaby 2014). To date, it has developed several projects, which work particularly as business and technology incubators, including King Abdullah Bin AbdulAziz Science Park (KASP), Saudi Organization for Industrial Estates and Technology Zones (SOIETZ), Information

Technology and Communication Complex (ITCC), King Saud University Science Park (KSSP), King Abdul Aziz City for Science and Technology (KACST), Umm Al Qura University Institution of Innovation and Entrepreneurship, Business Incubators and Technology Center in Royal Commission for Yanbu, as well as many technology incubators, especially, technology parks that are under planning.

Being in the earlier stages, a large emphasis is kept on creativity and the sharing of knowledge, staff training and development along with offering support and assistance to other incubators, so as to extend the scope of these incubators in the Saudi Arabia (Khorsheed, Al-Fawzan & Al-Hargan 2014). For example, one premier technology research park in the Middle East is the King Abdullah University of Science and Technology (KAUST) Research and Technology Park. KAUST Research and Technology Park is part of a far-reaching innovation network which supports and encourages the creation of technology, business formation and development assistance through the channels of already established technology firms and the marketplace. The Park provides an environment wherein technology-based businesses can collaborate on diverse aspects of research and development with both the faculty as well as the KAUST students by being provided access to its labs, equipment and services. Through its dynamic community of entrepreneurs and innovators, the Research and Technology Park fosters collaborative research, nurtures economic growth and helps the university promote the commercialization of its intellectual assets. With time, as investment in recruiting manpower and international collaboration are spent, there is a trend of broader awareness and IP in the Saudi technology incubation scenario as well. With that forums for knowledge transfer are being slowly introduced in its usual focus towards creativity and innovation (Alsodais 2013).

Some minor projects working in the field of technology incubation based heavily on previous research, experience, and knowledge sharing in Saudi Arabia include the King Abdullah Initiative for Water Desalination using Solar Energy being carried out in collaboration with IBM (Alsodais 2013). There are many projects working under this technology incubator. Firstly, the STI Human Resources Program is a project designed to establish and support creativity and scientific innovation centers; award higher education scholarships for strategic technologies; to design a scientific method for research, as well as to honor Saudi inventors and prominent scientific scholars. The Knowledge Society Program within the same larger technology incubation program takes initiatives including the publishing of scientific journals; development of national databases for the STI indicators; development of a database for information technology, commercial, and industrial services; and the promotion of cultural awareness within schools and universities. All of these instances show that Saudi Arabia is indeed working towards leveraging the results of its national research in commercial, industrial, and academic settings. Although, in view of the global practices and developments, Saudi Arabia lags much behind, however, it can move much forward in the field of efficient knowledge sharing-based technology incubation by its commitment to innovation and technology, especially to efficient knowledge sharing at a global scale. Saudi Arabia has implemented the use of business incubators' processes as a national policy, influencing the emergence of several government-supported programs. The BADIR for Technology Incubation Program spearheads the BI process in Saudi Arabia from within the Technology Development Center (Al-Ohali & Shin 2013; Binsawad, Hawryszkiewycz & Kang 2016; Khorsheed & Al-Fawzan 2014; Khorsheed, Al-Fawzan & Al-Hargan 2014; Tadros 2015). There is an increasing effort by the Gulf Cooperation Council states to provide support to business incubators in the bid to improve

entrepreneurship and knowledge-based expertise within their respective nations (Khorsheed 2015; Nurunnabi 2017). The efforts continue to be significant in the enhancement of GCC states' global competitiveness. It has been reported that in 2010, five of the GCC states were already among the 20 countries worldwide where entrepreneurs expressed ease in finding venture capital for their innovative but risky business ideas and projects (Tadros 2015).

2.6 Assessment of the Impact of Technology Incubators

The incubation of new technology-based businesses by technology incubators is designed as a flexible process involving multiple stakeholders (Bergek & Norrman 2008b). According to Rothaermel & Thursby (2005b, "technology incubators are university-based technology initiatives that should facilitate knowledge flows from the university to the incubator firms".

The purpose of university-based technology incubators is to support networking opportunities to negotiate relationships between the university and local government by attracting venture-capital investors from the national or global business community to foster regional business cultures (Peng 2006).

Every stakeholder involved may contribute a certain objective, which in-turn acts as decisive factors for the efficacious working and success of the technology incubator. However, there are times when the objectives are not explicitly stated from the time of inception nor are the means for measuring incubator-success essentially linked to the objectives. In any case, the significance of well-defined objectives cannot be ignored; they can be broadly classified as follows (Abetti 2004; Akçomak & Taymaz 2004; Al-Mubaraki 2008; Allen & Rahman 1985):

- Economic development
- Technology commercialization
- Property venture/real estate development
- Entrepreneurship

The success of firms being dealt with by technology incubators are evaluated in a traditional linear fashion i.e., an infant firm or a start-up company will work by support of the incubator for a few years, graduate or become independent and then hopefully grow (Allen 1985). The question here is whether survival of these firms alone is sufficient to reach the conclusion that they have achieved success after graduating from the technology incubator. Also, what parameters allow the technology incubator to produce successful firms?

There are start-up technology-based firms which rapidly expand from a small number of just two to three employees to 20 employees; they are even evident on the secondary stock markets. It is these which generate the most jobs and revenue among all the SMEs, and it is within these that technology incubators should actually be flourished (Cheng & Schaeffer 2011). However, promoting such fast-growing companies is difficult, challenging, and may not even be possible in all circumstances. Thus, it is only sensible to identify "good practices" at the level of the technology incubator and measure the efficiency with which they are fulfilled to estimate the performance of a technology incubator. These good practices have been reviewed and outlined to be the following (Bergek & Norrman 2008a):

- Define objectives and mission from the outset
- Recruit entrepreneurial managers
- Focus on "cluster-based" (i.e., common) technologies

- Tailor and leverage existing services
- Build on local and international linkages
- Diversify sources of finance
- Share experience
- Improve evaluation mechanisms

Keeping the aforementioned criteria in mind, the performance and efficiency of technology incubators is dependent on their tendency to fulfill good practices i.e., adopting efficient working, thus enhancing their overall performance in the form of increasing the number of jobs created, the number of graduates/survival rates, increased sales and profits of tenant firms, the number of clients served, increased incubator-revenue and the new technologies contributed to market, not to mention the taxes paid by the incubators.

2.6.1 Influence of Incubation on Tenants.

Although the goals of incubation are not necessarily limited to the effects on tenant firms, this is still one of the principal goals of any business incubator (Mian 1996; Williams & Tsiteladze 2016). Therefore, a number of scholars have explored how incubation programs have measurable effects on their tenant firms. In general, there have been some mixed results that may give policy makers reason to question the effectiveness of incubation programs, while others suggest that the role of the university in the incubation process is less than would be expected (Rubin, Aas & Stead 2015). Indeed, incubation alone has been shown not to be a sufficient condition to predict form survival without the influence of other factors (Mas-Verdú, Ribeiro-Soriano & Roig-Tierno 2015). So, at the very least, incubation programs cannot guarantee results.

Overall, though, it is hard to fully gauge the impact of technology business incubators because the topic remains relatively new and loosely researched. A bibliometric metal-analysis of the state of knowledge as of 2016 suggested that there remains a paucity of research into business incubators and that overall knowledge is, at best, fragmented (Albort-Morant & Ribeiro-Soriano 2016). Additionally, context matters considerably, as the type of incubator among other contextual factors plays a significant role in determining the types of innovation to result from incubation in a particular program (Barbero et al. 2014). Thus, it is and may remain impossible to give a truly comprehensive appraisal of the effect of technology business incubators on tenants.

That said, there are some clear benefits to incubation. While incubation does not guarantee firm survival, long term strategic planning and preparation carried out during the incubation stage does significantly increase the chance of survival (Löfsten 2016). To reap these benefits, however, a firm must avoid the common disconnect between planning and action (Gately & Cunningham 2014). Another strong benefit is the networking it allows for. Firms have a chance to achieve both formal and informal socialization during their incubation tenure, and both these dimensions of socialization create meaningful social networks (Nijssen & van der Borgh 2017). The benefits of these social networks have been considerably attested to in the literature (Soetanto & Jack 2013). Incubators are also responsive to changing business conditions and adapt to the needs of firms as time and technology continue onward (Mian 2014). Perhaps most positively, though, a comparative cohort study found that incubation does exert a differential effect on firm growth and that incubated firms may receive up to as much as five times more business as non-incubated firms (Stokan, Thompson & Mahu 2015).

2.6.2 Incubators in the Developing World

Although the idea of a business incubator originates in the developed world, these institutions have come to play a role in the developing world as well. In this context, business incubators and technology business incubators tend to function as tools for enacting innovation policies (Mansano & Pereira 2016). In contexts such as China or other developing Asian economies, business incubators have become an explicit extension of state efforts to encourage and improve innovation (Jamil et al. 2016). Indeed, this is not exclusive to Asia, as such approaches have also seen use in the contexts of Turkey and South Africa, among a wide array of other developing economies (Özdemir & Şehitoğlu 2013).

In emerging economies, there is often a gap between available commercial services for businesses and entrepreneurial demand, and in the emerging economy context, incubators can serve as an intermediary to address these unmet needs (Dutt et al. 2016). Thus, in these contexts, the business incubator—and by extension, the technology business incubator takes on a new role as the instrument of enacting innovation, both because of policy and because of its potential to address unmet needs in the population. Another function of technology business incubators in the context of the emerging world is to encourage sustainable regional development using the resources of the university, which are often well suited to improving sustainability and encouraging green innovation on the part of tenants (Mian, Lamine & Fayolle 2016).

2.7 Creativity

Creativity is recognized in the literature as one of the important human resources that support organizations to create value for customers (Hill, Jones & Schilling 2014). Creativity generally means the efficiency of generation new ideas. In other words, creativity refers to the ability in creating a new idea or capability to think in a different

useful way. Creativity and innovation are critical to the success of any organizations (Mumford, Hester & Robledo 2012). Amabile et al. (1996) defined the creativity as valuable ideas or novel generating which individuals provide as teamwork or individually. Amabile (1997 stated that there are three elements of creativity that must be considered in order to reach the creativity within individuals. The three necessary elements for creating creativity as following: (1) Expertise: This is about the domain knowledge, experience, knowledge, abilities, proficiencies and similar areas of endeavor. (2) Creative Thinking Skills: to think creatively, (3) Motivations. There are two types of motivations. The first type of motivation is intrinsic motivation, which is the passion and desiring of someone to work on a task that is interesting, challenging and exciting for him. The second type of motivation is extrinsic motivation that is when mangers try to attract or convince individuals to work on a specific task by providing rewards systems as an example.

The concept of creativity covers a rather unexplored area in organizational research dealing with technological change and innovation within organizations (Woodman, Sawyer & Griffin 1993a). Researchers define creativity, creative behavior and the products of creative behavior, as the creation of a significant and expedient new product, concept, service or procedure through individuals involved in a complex social system working in collaboration (Arieti 1976). Technology business incubator being the supporter of start-up firms offering newer technology-based products in the market - starting from their conception to materialization - are dependent largely on creativity in the thought process of its employees and its overall objectives. According to the concept of organizational creativity given by Amabile (1988, technology business incubators harbor creativity in the form of incubating firms offering innovation, which may only be

a simple change or adaptation of a previous product or process and even the development of an entirely new service, idea, process, or product (Amabile 1988).

According to Bhabra (2014, creativity is in fact the 'driving force behind entrepreneurship' (p. 186). As a result, she describes it as what fundamentally supports the movement from the initial research and conceptual analysis phase into active experiment and then to the concrete development of important ideas (Bhabra 2014). Furthermore, as Chen (2009 explained, companies need to develop their three resource types: human, tangible and intangible, to improve the technological commercialization competence. Creativity, along with knowledge and expertise, is one of the central human resources that can help to achieve this outcome (Chen 2009). As such, the recruitment of knowledgeable, skilled and creative personnel can be integral to the overall performance of incubators.

2.7.1 Creativity and Performance of Incubators

Creativity having a direct correlation with innovation and positive organizational change, is a crucial factor impacting the performance of incubators. Creativity for the success of an organization like a technology incubator or any of its types must mean that it involves an understanding of certain parameters: the creative person, the creative situation, the creative product, and the circumstances wherein they interact (Getzels & Jackson 1962). Payne (1990) carried out a research identifying the factors which impact the degree of creativity, i.e., creative performance of the organization; they deduced the availability of resources, effective leadership, manageable group size, cohesiveness, patterns of communication, and diversity in the team are all crucial factors that impact creativity and thus the performance of an organization (Payne 1990).

Keeping the aforementioned factors in mind, the Saudi technology business incubators can especially reap the benefits by improving on individual creativity. Previous research

has proved the usefulness of creativity and it is worthwhile to be employed in Saudi Arabia for the success of its technology incubators. For instance, Long & Andrews (1981) revealed that one parameter, group diversity, in an organization was alone responsible for 10% of the total variance in scientific recognition, effectiveness, and publication records of the research and development teams. Thus, the technology business incubators in Saudi Arabia should consider manipulating group compositions and characteristics for a positive influence on their creative processes, how the groups working within technology incubators approach problems, and solve them.

A review of current literature reveals that multiple different factors, such as group composition, individual's characteristics and leadership, are all significant for the creative outcomes in the groups working within an organization. King & Anderson (1990) identified the need for leadership, cohesiveness, group longevity, group composition and group structure to form the basis of group creativity and innovation. They summarized their findings by asserting that the likelihood of creative ideas to occur and to be presented by a working team may be greatest when their leadership is autonomous and concerted. Furthermore, they recommended that the structure of the leadership is be organic rather than mechanistic and that the groups ought to be composed of individuals drawn from many diverse fields or functional backgrounds. On the other hand, the cohesiveness and longevity of working groups represents the characteristics of groups, whose relationship to creativity, though ostensibly important, is, in fact, problematic. There is evidence that reveals that a curvilinear relationship among the cohesiveness of groups and their creative performance is more fruitful since it allows a flexibility in their adapting to newer situations, ideas, and members (Nyström 1979).

For the creative process to flourish, it is essential that individuals lose their tendency to work on specific lines of work; multidisciplinary teams help individuals to overcome their hindrances created by their expertise in a particular field only because such teams can link various concepts and problems arising together in one technology (Damanpour 1996). Basically, a development of these teams in technology business incubators along with fulfillment of other parameters that aid in inculcating creative performance can help ensure the successful working of the incubator. According to Twiss and Times (1992), diverse teams help to increase the effectiveness of an organization because it eliminates the mental constraints that may exist otherwise.

In a case study of the performance indicators for business incubators, Al-Mubaraki & Wong (2011, p.759) pointed to the Belgium example of an incubator established in 1996 to provide guideline and assistance from professionals and business experts in supporting small companies to grow. As the authors explained, the primary objective of the incubator was to "foster creativity among starts ups and small to medium size enterprises." In turn, to meet this outcome the authors drew attention to the important role that the recruitment of young graduates who have creative and innovative ideas plays in the transfer of technology to industry (Al-Mubaraki & Wong 2011).

Similarly, Chambers (2011) conducted case study research in incubators throughout the European Union. The author reported that incubators can be used as a way to endorse and encourage entrepreneurship. As such, the establishment of creative and dedicated business incubators can enhance the nature of the support provided to incubatees to help them to grow their business by providing an environment that combines inspiration, motivation and enthusiasm (Lee, Florida & Acs 2004). According to the authors, creativity as a driver in the incubators can lead to the development of creative clusters

that can stimulate in entrepreneurs a creative approach to driving improvement within the broader business community as well as result in greater creativity and innovation throughout the economy (Chambers 2011).

Hjorth (2013) asserted that creativity within a framework of cooperation is one of the most vital aspects of innovation in the post-industrial age. As argued by the author, knowledge generated within the collaborative dynamic such as that offered by a business incubator must be experiential in nature. Furthermore, it must be socialized in such a way that is becomes internalized by the incubatees and integrated into their general skills and competences (Hjorth 2013).

According to Al-Mubaraki & Wong (2011, the creativity that is generated in the incubator is fundamental to the effectiveness of the transition from pure ideas to the diffusion and commercialization of product. Furthermore, Close (2015) argued that creativity is a critical component in the incubator environment at it plays a key role in motivating tenants in their pursuits. According to the author, creativity enhances the performance of incubators as it encourages new entrepreneurs to learn by doing in a targeted and unique way (Close 2015). A creative approach to the development of structured training programs and business building can contribute to the successful launch of the start-ups as the new entrants are eager to apply their new knowledge or approach to the changing demands of the market (Close 2015).

Sami Alsodais, Director General of the Saudi Patent Office in KACST, states, “We all agree that intellectual property (IP) is a stimulus for creativity and innovation in the world. It positively influences the global economy by encouraging fair competition, and developing innovative products and methods, as well as increasing literary creation” (Alsodais 2013). In Saudi Arabia, special IP laws are in place that are revised and

updated continually in order to ensure that an effective legal framework exists which not only promotes creativity, but also enforces rights for its protection with an individual's name. The National Science, Technology, and Innovation Plan (NSTIP) has targeted specific areas as per it strategic policy to encourage research and development within these technological areas, including water technology, biotechnology, advanced materials and nanotechnology, information technology, electronics, communications, oil and gas, petrochemicals, medical and health, space, energy, environment, agriculture, and construction (Figure 2.3). The government strengthens its domestic and regional innovative capabilities by continually seeking and recruiting skilled scientific and technical scholars to work within the many different strategic areas of technology. Numerous agreements designed to foster scientific and technical collaboration have also been signed between the Saudi Arabia government and many international institutions in order to generate experience and acquire know-how. In this manner, the Middle East giant has developed fertile soil in which its residents can freely sow their creativity and innovation, thus reaping the benefits of both. There are higher levels of investment in these two areas as they are integral to the country's long-term vision of technology development and innovation through the NSTIP.

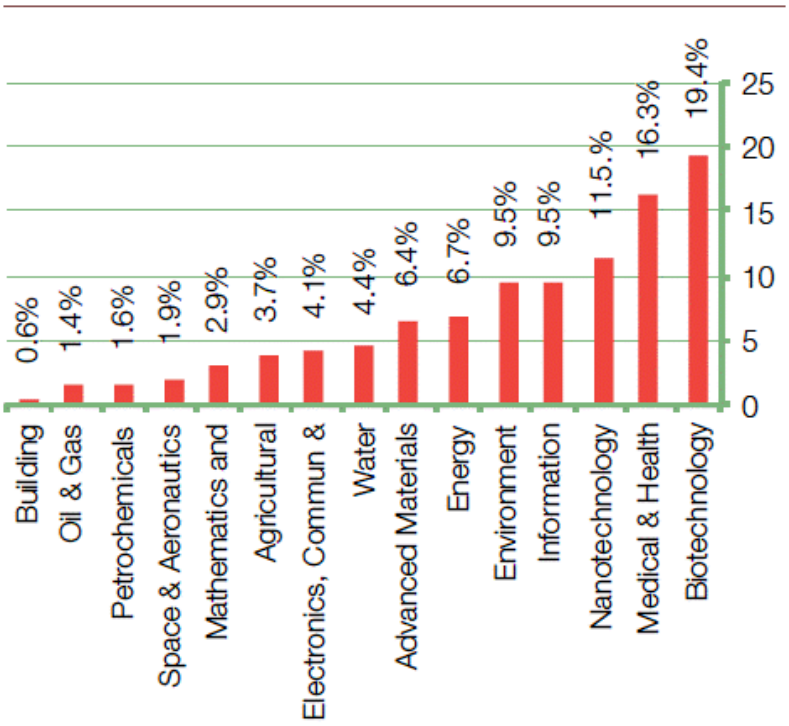

Figure 2.3: The Percentage of Funded Projects in Various Technology Areas by NSTIP Technology Incubator in Saudi Arabia (Alsodais 2013)

2.8 Knowledge Sharing

Knowledge exists within individual for creating, recognizing, archiving, accessing, and applying knowledge in performing their tasks. Knowledge is considered as source of organization competition (Yang & Wu 2006). Different researchers utilize different terms in describing and defining knowledge. Knowledge has been described as a person's stock of expertise or as the result of the integration of facts, models, ideas, intuition, and opinions while making a decision (Wang, Noe & Wang 2014; Yu, Yu & Yu 2013). Knowledge has been defined as a justifiable true belief while it has also been described as the combination of these elements: information, experience, benchmark value as well as the cultural norms (Wang, Noe & Wang 2014; Yu, Yu & Yu 2013). Knowledge sharing can take two forms, explicit knowledge sharing and tacit knowledge sharing (Nonaka & Takeuchi 1995). According to Shao, Feng & Liu (2012) "explicit knowledge is formal and systematic, and can be achieved through readings of project

manuals and team discussions, while tacit knowledge is highly personal, context-specific, subjective, and can be represented in the form of metaphors, drawings, non-verbal communications and practical expertise."

Nabil Shalaby, a Saudi Entrepreneurship and SME Department Adviser, played on the old Chinese proverb, "Don't give me fish, but teach me how to fish," to state, "Don't give me a fish, but teach me how to start a fish farm" (Shalaby 2014). Indeed, that is the spirit of knowledge sharing in business and which works behind the success of technology business incubators. Knowledge is a significant resource that helps to preserve the valuable heritage, the learning techniques, problem solving techniques, core competencies of organizations, and to initiate new useful situations (Liao, Fei & Chen 2007). Knowledge sharing may develop competitive advantages for an organization, such as through the enrichment of intellectual capital by encouraging the internal exchange and creation of knowledge. Furthermore, as knowledge is recognized as the key factor behind achieving constant innovation, it is considered a strongly correlated factor for the evolvement of any organization; thus, it is also a crucial indicator requiring to be studied in facilitating the efficient performance of technology business incubators.

Knowledge sharing is, in turn, dependent upon knowledge management – an essential activity in all businesses. Knowledge management is a broader term, which caters to a wide range of topics while knowledge sharing is a specific focus area of knowledge management (Hendriks 1999). Knowledge sharing, when performed in coherence with other aspects of the step-by-step process of knowledge management: knowledge capture, knowledge development, knowledge sharing and knowledge utilization, can fulfill a strategic necessity for organizations that wish to enhance their capabilities and performance (Lee & Hong 2002).

Connell, Kriz & Thorpe (2014) supported the underlying assumption that contemporary business practice is often reliant on the creation of networks within and between organizations. As such, they argued the importance of what they referred to as knowledge spill-over. This refers to the effective use of knowledge sharing among individuals and teams within companies, as well as individuals, teams and businesses across different locations (Connell, Kriz & Thorpe 2014). In regards to knowledge sharing, Bøllingtoft (2012 stated that the preferred options for the incubators was for housing firms because this increases the opportunities for the entrepreneurs to create communities of common purpose and thus positively impact knowledge sharing.

2.8.1 Knowledge Sharing and Performance of Incubators

Knowledge sharing is a part of knowledge management, and, thus, both are interrelated, i.e., inefficient knowledge management produces inefficient knowledge sharing and vice versa. It is a basic idea of knowledge management that knowledge may be communicated and shared (Marr, Schiuma & Neely 2004).

According to Nonaka et al. (2014), creation of new knowledge is a continual transformation of tacit to explicit knowledge. In other words, the tacit knowledge already existing within the organization through individuals' experiences, ideas and beliefs enables the knowledge creating activities conversion process, which is articulated and, thereby, transmuted into explicit knowledge (Nonaka et al. 2014).

In universities, the most important knowledge is often in the mind of academics. As knowledge-based organizations, universities by their very nature have knowledge embedded in their people and processes. It is one of the responsibilities of academics is to transfer their tacit knowledge into more explicit practices for further use by the

stakeholders. Universities are an attached part of our growing society and play a major role in tacit knowledge transfer (Chugh 2013), such as through seminar and workshops, regular documentation like FAQs, administrative manuals, lessons learned, and reports, and during time off work and social gatherings. In the context of university-based technology incubators, university should facilitate knowledge flows to the incubator (Rothaermel & Thursby 2005b).

Research has indicated in countless instances that the performance of an organization in its various parts is notably enhanced, when the workers and even members of a team share tacit knowledge; this tacit information may be based upon their personal effective practices, understandings, skills, experiences, predilections, the lessons learned, as well as all sorts of sense – whether common or uncommon (Chugh 2013). This means that knowledge sharing expects individuals to adjust and allow their beliefs and actions to be influenced through more or less mutually intense interaction with their peers (Von Krogh 2002).

In actuality, sharing of knowledge is a straightforward process, an activity, or behavior. Van den Hooff and Van Weenen (2004) distinguish between the two different forms of knowledge sharing, which can also be beneficial for a technology business incubators (Van den Hooff & de Leeuw van Weenen 2004). These are: (i) knowledge donating and (ii) knowledge collecting. Knowledge donating is "the process of individuals communicating their personal intellectual capital to others" while Knowledge collecting is the "process of consulting colleagues to encourage them to share their intellectual capital" (Lin 2007; Othman, Hawryszkiewycz & Kang 2014; Van den Hooff & de Leeuw van Weenen 2004) Any knowledge sharing which occurs between an organization's employees will normatively be based upon both donation and collection. Any person in need of knowledge will acquire it after going through both steps.

Knowledge donating is defined in the same research as a means of communicating with others regarding the extent and nature of one's personal intellectual capital, whereas knowledge collecting entails consulting colleagues in order to encourage them to share their own intellectual capital. Both the said processes are active processes; in other words, they are facilitated either by a person actively communicating with others what they themselves know or by actively consulting with others in order to learn what knowledge they hold. A continuous two-way communication increases the chances of gaining maximal critical evaluations and opinions on an issue thus ensuring maximal coverage of all stakeholders' ideas, objectives, risks, and expectations.

The method by virtue of which knowledge is shared may involve any organization's unique culture, characteristic, or system; this may have a distinct influence on the business' performance. In the case of a technology business incubator, such a method of sharing knowledge will also affect the type of businesses it helps to start-up and the extent to which the support provided can be effective in the long-run (Liao, Fei & Chen 2007). In addition, research indicates that the active sharing of knowledge by the employees of an organization begins, when everyone within the system 'voluntarily' and passionately donates their knowledge and are 'eager' to collect it from others as well whether they need it or not. In this way, a knowledge-sharing cycle is generated in the organization. In technology business incubators, keeping in mind the objectives, such a pursuit of knowledge and its sharing, much success can be achieved if knowledge sharing is added in the common objectives. Here, technology business incubation can be effective with knowledge sharing but it happens only through motivation of individuals, who willingly and candidly contribute their specific and personal knowledge to any other person in the organization with no bias. Furthermore, it is only motivation that will help a person in demand of knowledge to be truthfully

willing to learn from and utilize it, otherwise the knowledge gained may simply go futile.

Keeping the above discussion in mind regarding knowledge sharing, it can be assumed that, in a 'resource-based' view of any business, knowledge may be considered the most strategically-important resource; this assumption is supported well through research (Conner & Prahalad 1996). In the case of technology business incubators, the question is how an asset as important as knowledge can be transformed into a valuable possession for the organization in order to ensure efficient performance and competitive advantage. The answer lies in effective management of all knowledge available. According to Liebowitz (2001), knowledge management is a process whereby value is created from any organization's unmanaged or intangible assets. Hendriks suggested the sharing of knowledge to be the core activity of knowledge management (Hendriks 1999). Hence, it is advisable that knowledge sharing is employed as an essential process in modern organizations, especially the technology business incubators, of Saudi Arabia. This will help to ensure a successful enhancement of the intellectual capital in the incubators, which in turn promises effective working, thus more successful technology-based businesses in the country. Only when the knowledge produced from individuals and companies is fully translated into organized knowledge can the supporting organization begin to manage its knowledge-based resource effectively (Van den Hooff & de Leeuw van Weenen 2004).

The role of knowledge sharing in the performance of business incubators was evaluated by Zibarzani & Rozan (2017). According to these researchers, startups usually do not have enough knowledge, ability, and understanding of the strategies to acquire the needed knowledge. Business incubators, including technology incubation centers, have emerged to enhance the startups' access to these resources through external networking

as well as reduce their risks of failing, which ultimately improve their competitive advantages well (Zibarzani & Rozan 2017).

More literature has established that knowledge sharing and startups' performance are related to each other, but it is only recently that the connection between knowledge sharing of clients and performance of the business incubators was being explored. Finding out whether this holds true for technology incubator centers is the goal of the current study (Rubin, Aas & Stead 2015; Zhang, Wu & Zhao 2016).

In relation to the Saudi Arabian context, Alshumaimri, Aldridge & Audretsch (2010) posited that the use of incubators to support technology transfer and knowledge spill-over is crucial to the nation's transition towards a knowledge-based innovative economy. As explained by the authors, a key objective of the Ninth Development Plan of the Kingdom is to invest in the development of technology / business incubators to promote knowledge sharing and technology transfer among participants in the technology systems as well as improve awareness of science and technology across the broader Saudi society (Alshumaimri, Aldridge & Audretsch 2010).

One of the recent developments in Saudi Arabia to support knowledge sharing and technology transfer is the Central Core zone. This is one of five zones in what is called the Riyadh Techno Valley, established to facilitate the nation's transition to a knowledge economy by taking advantage of spatially constrained knowledge spillovers. The four other zones include the Biotechnology Valley, the Chemical Technology and Materials Valley, the Informatics Technologies and Communications Valley, and the Scientific Village (Alshumaimri, Aldridge & Audretsch 2010). With regard to the Central Core zone specifically, the area includes the technology / business incubators along with the Centre for Entrepreneurs and the Office of Support Services of

Operations Research and Intellectual Property. Also included in the zone are laboratory spaces to support local market initiatives and government research and development centres (Alshumaimri, Aldridge & Audretsch 2010).

2.9 Innovation

The root of the word, think, comes from Latin verb *cogito,* which literally means to "shake to together" (Koestler 1964). Innovation is described in different ways of idea, practice, or project that an individual or unit perceived as new. It does not matter if the idea, practice, or project is really known; it is still considered an innovation if the person or unit perceived it to be (Rogers 2003). Peres, Muller & Mahajan (2010) defined diffusion of innovation as ''the process of the market penetration of new products and services that is driven by social influences'' (Peres, Muller & Mahajan (2010, p.91). On the basis of this definition the authors asserted that the spread of innovation is an increasingly complex and multifaceted process. The authors based this claim on the view that modern consumers are exposed to diverse influences including word-of-mouth communications, network externalities and social signals (Peres Muller & Mahajan 2010). Hence, recently developed diffusion models aim to explain the diffusion of innovations in relation to these influences.

All innovations that are materialized may either be completely novel or can be formed from the preexisting devices and materials. For instance, Adam Smith while discussing division of labor wrote that the known improvements in machinery are mostly carried out by men of speculation or even philosophers (Smith 1937). These men are not related with trade; but they bring innovation to the world by observing things and processes around themselves. They have a will to ponder, learn, and take action, which enables them to work in fields outside of their field of expertise and combine the powers of

distant and dissimilar objects. Many years later, Charles Babbage also pointed out regarding the phenomenon of innovation that "the power of inventing mechanical contrivances, and of combining machinery, does not appear, if we may judge from the frequency of its occurrence, to be a difficult or a rare gift" (Babbage 1832). However, this is not where history stops as Schumepter subsequently proclaimed that every method of production symbolizes a specific combination (Schumpeter 1934). Different methods of production and innovation can easily be distinguished by the manner of combination present, which may be either by the objects which have been combined or the relationship between their quantities. Thus, he concluded that, "Every concrete act of production embodies for us, is for us, such a combination."

2.9.1 Diffusion of Innovation (DOI)

According to the Diffusion of Innovation theory, there are five supposed innovation characteristics: relative advantage, compatibility, complexity, observability and trialability. This study uses relative advantage, compatibility and complexity because they are considered as the most significant constructs in relationship to incubator performance. The used characteristics are discussed more in detail in Chapter 3.

This theory provides four main elements to consider when assessing innovation adoption: innovation, communication channels, time, and social system. Rogers described innovation as an idea, practice, or project that an individual or unit perceived as new. It does not matter if the idea, practice, or project is really known; it is still considered an innovation if the person or unit perceived it to be (Rogers 2003). Rogers explained that in adopting innovations, uncertainty can serve as an important obstacle. The potential consequences associated with an innovation can create uncertainty. To reduce uncertainty in the process of adopting the innovation, communication is the key. All individuals that might be affected by the adoption should be informed of the

advantages and disadvantages of the adoption so they can be aware of the consequences. Consequences can be either positive or negative, desirable or not, direct or indirect, expected or unexpected (Rogers 2003).

The second element is the communication channels. According to Rogers, this element refers to the process where participants form and exchange information to arrive at a mutual understanding. Communication takes place through channels connecting the sources. A channel is a method that enables a message from the source to reach the receiver. Diffusion refers to a special kind of communication, which encompasses these communication elements: an innovation, two parties or units in communication, and a channel. Two most common communication channels are mass media and interpersonal communication.

Time is also another important element in the diffusion of innovation. Lastly, the social system can influence the diffusion process (Rogers 2003). The social system is described as a set of unified units commonly solving a joint problem to achieve a similar goal. Because diffusion of innovations is said to take place in a social system, it is affected by the system's structure. Structure refers to the patterned arrangements found within the system Rogers added that the nature of the social system can affect the level of innovativeness of the individuals, which is why it is the key criterion of categorizing adopters.

This theory describes the innovation decision process as one of information-seeking and processing in which the individual focuses on lessening uncertainty concerning an innovation prospect's associated benefits and costs. For Rogers, the process is composed of five steps or stage: knowledge stage, persuasion stage, decision stage, implementation stage and the confirmation stage (Rogers 2003; Sahin 2006). In the knowledge stage, the individual learns of the innovation and research more about it to

gain information. Critical questions about the innovation are asked. In the persuasion stage, the individual continues to search more information so as to transform an attitude (positive or negative) about the innovation into a decision (reject or adopt) (Rogers 2003, 2010).

The last stage is the confirmation stage, which is the time when the innovation decision has already been made. At this time, the individual is looking for support for the decision that was made.

2.9.2 Diffusion of Innovation (DOI) and Performance of Incubators

Innovation is often described as the change and "newness" that a firm is capable of offering to the world; it can either be a product, a service, or any other type of innovation; this also includes the way it creates and transports those offerings i.e., the diffusion of innovation (Liao, Fei & Chen 2007). Apart from the many ways in which a technology business incubator can achieve competitive advantage, here, I have discussed the properties and characteristics of innovation as well as the diffusion of innovation among the masses, which render innovation and strategic flexibility important for efficient performance of technology business incubators.

To begin with, innovation is a critical activity for all companies. To facilitate an understanding of the concept and to make its practical implementation feasible, innovation is often divided into many different classes by different researchers. As per the innovative capability in previous studies, innovation can be categorized as (i) the technical aspects of innovation; and (ii) the management aspects of innovation (Liao, Fei & Chen 2007). As far as the technical aspects of innovation are concerned, Marquis (1969) provided his categorization as follows: (i) radical innovation; (ii) incremental innovation; and (iii) systems innovation (Marquis 1969). Another type of categorization is given by Betz (1987), whereby innovation is called the next-generation technology

innovation (Betz 1987). Moving on, Samson (1991) has categorized innovation into three categories, namely, (i) product innovation, (ii) process innovation and (iii) managerial and systems innovation (Samson 1991).

Diffusion of innovations, on the other hand, is a separate phenomenon, which seeks to explain how different innovations are adopted and accepted in a population (Robinson 2009). Here innovation holds the same definition of an idea, behavior, or object, which is perceived to be novel by the concerned audience. Diffusion of information is thus a social change, which offers valuable visions as to how innovations can be manipulated to be more useful than before. It is worthwhile to note what qualities enable an innovation to spread, the significance of peer-to-peer conversations and peer networks, and also understanding the needs of different user segments. The diffusion of innovations works by adopting a very different approach as compared to most other theories of change. It focuses on change as an entity concerned with evolution or "reinvention" of products and behaviors, rather than concentrating on persuading individuals or users to change. Diffusion of innovation thus works by making the product better fit for the needs of the users. It is the innovation that changes and adapts, not the people or users.

After the clarification of the concept of innovation and diffusion of information, the question is how these are employed within companies and firms, especially technology business incubators for an effective performance. As per the definition and aforementioned categorizations, a firm's innovation capability is dependent on its product innovation, process innovation and managerial innovation (Liao, Fei & Chen 2007). In case of a technology business incubator, the first definition of product innovation is radically significant considering the objective of supporting newer firms. The technology business incubator or any of its type should be able to provide

distinguished or new products i.e., start-up businesses with innovative products, that are usable by the public and can obtain satisfaction from customers. Similarly, incubators have to ensure product improvement and new product development, which is able to satisfy customers in order to perform efficiently.

University-based technology incubators afford space wherein new ideas can be developed through interactions with researchers, operating as what has been termed a "knowledge hub" for the local or regional innovation system (Youtie & Shapira 2008). Moving on, technology business incubators can very well employ innovation in their working by managing how they recruit newer firms, sponsor them, and monitor their operations in order to incubate them towards better performance and success in the market (Tola & Contini 2015). Considering it true that all types of technology spreads among the masses as a result of the economic processes controlled by the market dynamics, then it should also hold true that the design of the product being brought to the market by any technology incubator, its diffusion, and absorption into people's lifestyles and its subsequent success (or the failure) is subject to the complex trends existing within social and cultural frameworks.

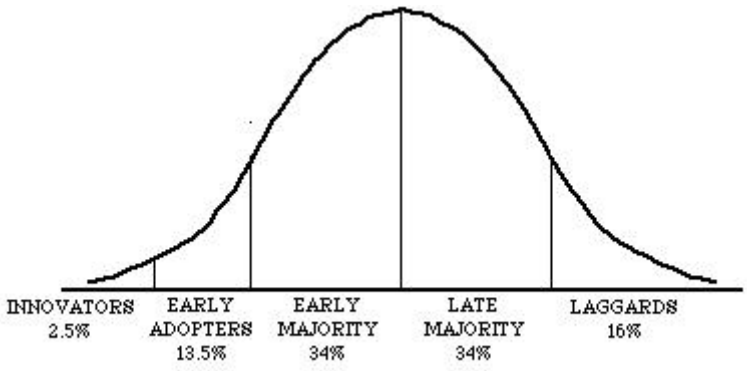

Figure 2.4: Rogers' Innovation Diffusion Bell Curve (Wiliams 2008)

The complexity of the social process working behind the marketing of a product is seen in the theory of diffusion bell curve (Figure 2.4). In this bell-shaped curve, a part of the product being introduced in the market will go through several steps before it is completely incorporated in to the general life of people. Within the curve, there exists as a segmentation, the different segments of which represent the diverse types of subjects existing in society: innovators, early adopters, the early majority, the late majority and the stragglers. While the technology incubators follow this curve for their products, i.e., start-up firms, in the early phases, their aim is to create and develop a productive micro-environment for new companies by affording physical spaces and support services able to steer the enterprise through the start-up phase. Moving on, the focus of technology business incubators moves towards intangible services with more value, such as tutoring, mentoring and networking activities, and even fundraising initiatives. In this way, they participate in economic development and the generation of new jobs through talent integration, diffusion of technology, knowledge and revenue within a given region, which supports the new companies' development.

In the technology business incubator, the diffusion of the innovation curve followed through provision of services, shared costs, and economies of scale increases the chances of survival of the companies being incubated. Taking into account the potential for economic development promised by technology business incubators if they employ diffusion of innovation, a variety of methodologies characterizing the different stages of incubation have been developed. In order to carry out diffusion of innovation, the first Scientific Technologic Park, named the "Stanford Research Park", was created in 1951 in California. In this particular technology business incubator, many university professors, researchers and alumni were able, for the first time, to translate their research results into industrial products. This is a spontaneous process resulting from

research carried out in the various universities and research organizations. The purpose of Stanford Research Park is to create new businesses that can be researched on and innovated (Tola & Contini 2015). Currently, this technology park, encourages its incubates to optimize the organization of strategic assets in order to collaborate in developing an advanced economy, reviving industrial areas hit by crisis or stimulating areas which are lagging behind (Tola & Contini 2015).

Thus, today, we have a greater understanding that innovation and the ability to eliminate problems by adopting unconventional solutions provide the most efficient tools for survival in the critical phase currently facing the global economy (Tola & Contini 2015). Innovation diffusion is also among one of the means which are often manipulated as an unconventional mean towards fighting the current trends in global economy. It is a wide-ranging and multidisciplinary field of study, extending from the study of new consumption goods to the evaluation of new production processes and from new organizational structures to novel scientific and cultural developments (Tola & Contini 2015). According to Schumpeter (1934), the success and survival of an economy can only be ensured the constant innovation of if its entrepreneurs, and, as a result, the ongoing contribution to global competitiveness. In such a scenario, the means whereby technological innovations are diffused will influence the whole economic system.

2.10 Chapter Summary

This chapter contains an intensive relevant literature review in order to afford the groundwork for the research conceptual model discussed in detail in the next chapter (Chapter 3). Initially, the chapter discussed business incubators in general and in the Saudi context in particular followed by investigation of various factors influencing

technology business incubators' performance, including knowledge sharing, individual creativity and diffusion of innovation.

CHAPTER 3: THEORETICAL BACKGROUND AND RESEARCH MODEL

This chapter provides a theoretical groundwork for the development of the proposed model based an intensive overview of the literature review discussed in Chapter 2. The purpose of the study is to investigate the impact of the knowledge-sharing process, individual creativity and diffusion of innovation towards Saudi Arabian technology incubators' performance. Correspondingly, this chapter discusses the adopted research model followed by the description of each factor studied. Then, hypotheses are developed.

3.1 Theoretical Background

Developing a theoretical model depends upon general theoretical understandings from the related literatures, studies and existing empirical evidence pertaining to the phenomenon under investigation. Therefore, this section reviews several related models and theories to the development of a developed model. These theoretical foundations involve existing models related to knowledge sharing, diffusion of innovation (DOI) theory and individual creativity towards organization performance. Literature available on research carried in technology incubators is limited, so studies conducted in organizational setting are also cited that could afford a theoretical foundation for the study.

3.1.1 Knowledge-Sharing Process

The knowledge-sharing process contains two dimensions namely knowledge donating and knowledge collecting (Lin 2007; Othman, Hawryszkiewycz & Kang 2014; Van den Hooff & de Leeuw van Weenen 2004). This means the process which individuals

mutually transfer and create knowledge. In organizations, the process of knowledge sharing concerns the available knowledge to be shared among employees so as to create valuable knowledge contents that are able to enhance the creation of both organizational intellectual property capital and growth (Nonaka & Konno 1998). Knowledge sharing is, as the name suggests, the sharing of knowledge between two or more parties (Martinsons, Davison & Ou 2015). Thus, the notion of a business incubator is founded on the notion of knowledge sharing—namely, sharing the knowledge of a university with new or developing business. However, while the idea of what knowledge sharing is quite simple and intuitive, the actual process of knowledge sharing is considerably more complicated (Martinsons, Davison & Ou 2015). Accordingly, scholars have given certain attention to understanding this process. As a process, knowledge sharing contains two primary dimensions: knowledge donating and knowledge collecting (Lin 2007; Van den Hooff & de Leeuw van Weenen 2004). That is to say, the process must be examined from the side of the party offering knowledge and the perspective of the party receiving that knowledge. In this sense, knowledge-sharing processes can be looked at as a form of communication between two or more parties.

Thus, like any communication process, knowledge sharing is subject to certain difficulties. A wide variety of factors serve to determine the success of a knowledge-sharing process, including the disposition of the parties or the medium of communication (Parke, Campbell & Bartol 2014). The results of these factors are not always obvious or intuitive; indeed, sometimes practices or venues established by an organization explicitly for the purpose of knowledge sharing within the organization can have unintended detrimental effects on the knowledge-sharing process (Majchrzak et al. 2013). Therefore, even though technology business incubators exist primarily to facilitate knowledge sharing between universities and businesses, their actual effect on

the knowledge sharing process should not be taken for granted. Instead, based on the existing theory of knowledge sharing, the current study measures knowledge-sharing processes as a potential predictor of technology business incubator performance.

However, in so doing, there are other dimensions than sender and receiver that must be acknowledged, because knowledge exists on multiple levels. Both the sender and the receiver in a knowledge-sharing process can be a person or an organization, and the characteristics for personal knowledge differ from those of organizational knowledge (Connelly & Kevin Kelloway 2003). Therefore, the literature suggests that the factors involved in knowledge sharing are often classified into individual and organizational dimensions (Connelly & Kevin Kelloway 2003; Lee & Choi 2003). The following section examines these two dimensions in greater detail.

Table 3.1: Summary of Existing Studies Related to the Knowledge-Sharing Process

Source	Method	Idea of knowledge-sharing processes	Findings	Relation to this study
Connelly & Kelloway 2003;(Hahn, Lee & Lee 2013)	Development and validation of new measures for organizational and individual factors.	The effects of various organizational and individual characteristics on knowledge sharing at both the individual and organizational levels.	Gender, perceived management support, and perceived knowledge sharing culture were all significant predictors of knowledge sharing.	Background on knowledge-sharing process
Majchrzak et al. 2013	Meta-analysis of the existing literature on social media and knowledge sharing.	The effect of social media on knowledge sharing when used an organizational affordance.	Social media has mixed, contradictory effects. Can help knowledge sharing but also have unexpected, detrimental effects.	Background on knowledge-sharing processes.
Parke, Campbell & Bartol 2014	Experiment consisting of 644 participants within 161 virtual teams in a virtual team simulation.	Examined the ways in which team leaders can encourage team knowledge sharing.	Too much effort to structure the team in advance is detrimental, but practices like face-to-face kickoff meetings can help.	Background on knowledge-sharing processes.

Martinsons, Davison & Ou 2015	Literature review on the theory of the knowledge-sharing process	The factors involved in the knowledge-sharing processes used by Chinese organizations.	Six stages of knowledge sharing identified: abstract, identify, select, explain, synthesize, and validate.	Background on the knowledge-sharing processes.

3.1.2 Knowledge Sharing Individual Factors & Organizational factors

3.1.2.1. Individual Knowledge-Sharing Factors.

With regard to individual knowledge sharing, a tremendous amount of studyies have been conducted over time, and the literature suggests that the dimensions most often attributed to it are an individual's self-efficacy (Lin 2007; Wasko & Faraj 2005), his or her enjoyment in sharing knowledge (Lin 2007), and interpersonal trust (Bijlsma & Koopman 2003; Davenport & Prusak 1998; Fukuyama 1995; Ma, Qi & Wang 2008). These factors serve to both encourage and facilitate the knowledge-sharing process for a variety of reasons.

Self-efficacy, for example, serves to encourage knowledge sharing on the part of the person who has obtained it because with self-efficacy comes confidence that one understands a task or subject (Tseng & Kuo 2014). Therefore, when one who has acquired self-efficacy sees others struggling or failing with that task, the confidence that his or her advice will be correct and useful will make him or her more likely to try to share knowledge (Tamjidyamcholo et al. 2013). In turn, self-efficacy may serve to facilitate successful knowledge sharing by making the receiving party more likely to believe that the knowledge sharer knows what he or she is talking about and therefore offering worthwhile knowledge (Tseng & Kuo 2014). Thus, self-efficacy is an essential part of knowledge sharing on the individual level, and should be understood in exploring the process of knowledge sharing in the context of technology business incubators.

That enjoyment in knowledge sharing should contribute to knowledge sharing is somewhat intuitive (Lin 2007). However, the specific role of enjoyment may be larger than simply enjoying the act of knowledge sharing outright. Enjoyment of knowledge sharing could also take the form of enjoying the way that sharing knowledge benefits others, enjoying the social interaction itself, or enjoying the social capital generated from being seen as knowledgeable and willing to help (Hau et al. 2013). Therefore, enjoyment of knowledge sharing is a deceptively complex dimension of the individual side of the knowledge-sharing process, and it should accordingly be well understood to understand knowledge sharing in the context of technology business incubators.

Trust is also an important aspect of knowledge sharing. In order to be willing to share valuable knowledge, the sender must trust the receiver with that knowledge, especially if it might potentially lead to damage if misused or is the source of some degree of advantage (Tamjidyamcholo et al. 2013). In turn, the receiver must trust the sender to some extent in order to be willing to accept the imparted knowledge make use of it, especially in contexts where imparting wrongful knowledge could bring harm or ridicule to the receiver if that knowledge was acted upon (Pinjani & Palvia 2013). Therefore, without trust, individual-level knowledge sharing often cannot take place. In understanding the knowledge-sharing process in technology business incubators, therefore, issues of interpersonal trust may play an important role.

3.1.2.2. Organizational Knowledge-Sharing Factors.

Organizational knowledge differs from individual knowledge, and, therefore, it is to be expected that the factors influencing organizational knowledge sharing should differ from those influencing individual knowledge sharing. At the organizational level, the most commonly studied motivational factors in knowledge sharing are management support (Artail 2006; Riege 2005b; Song 2009; Yew Wong 2005), information

technology infrastructure (De Vries, Van den Hooff & de Ridder 2006; Hsu 2008; Ismail Al-Alawi, Yousif Al-Marzooqi & Fraidoon Mohammed 2007; Kim & Lee 2004), and incentives and rewards (Bartol & Srivastava 2002; Davenport & Prusak 1998; Yew Wong 2005). Each of these dimensions has a role to play in understanding organizational knowledge-sharing processes.

Management support is an imperative aspect in knowledge sharing because of management's power to hamper or facilitate almost any organizational process. For example, the management can choose to organize teams in such a way as to promote knowledge sharing from the start (Parke, Campbell & Bartol 2014). Many of the individual level factors discussed in the previous section can also be affected by management support. For example, a transformational leader can, in the role of a manager, act to promote self-efficacy or trust on the part of employees (Mittal & Dhar 2015). On the other side of the issue, poor management choices or a lack of support can curtail knowledge sharing before it can be adequately enacted (Artail 2006). Understanding the management support role in knowledge sharing in business technology incubators is important from both the perspective of the incubator program and the perspective of the incubated businesses.

Information technology has a fundamental role in modern knowledge sharing. Therefore, it is reasonable to expect that an organization's information technology infrastructure plays an important role in organizational knowledge sharing (Hsu 2008). However, the role of this infrastructure is not always wholly clear. For example, technological innovations such as social media could be introduced with the intention of fostering knowledge sharing within an organization only to ultimately have mixed or detrimental effects (Majchrzak et al. 2013). Thus, the role of information technology infrastructure and the various aspects that define and comprise it are an essential part of

understanding how knowledge sharing occurs in technology business incubators and this aspect of knowledge sharing is important to the study.

Finally, incentives and rewards are another aspect of organizational knowledge sharing to consider. These may come from the management, and thus represent an aspect of management support, but they could also be more indirect rewards (Yew Wong 2005). For example, if an organization were to develop a culture particularly prone to knowledge sharing, then the social capital that an employee could receive for sharing knowledge would constitute a form of reward (Hau et al. 2013). Another way in which incentives and rewards could develop more organically is that if knowledge sharing resulted in better performance for a team or the organization as a whole, then the knowledge sharing might lead to increased profitability, which in turn could allow the organization to offer better compensation to employees (Gerhart & Fang 2015).

Table 3.2: Summary of Existing Studies Related to Individual and Organizational Knowledge-Sharing Factors

Source	Method	Idea of knowledge sharing	Findings	Relation to this study
Lin 2007; (Hahn, Lee & Lee 2013; Lin 2007)	Survey of 172 employees from 50 large Taiwanese organizations. Structural equations modeling to create a model.	Three-factor model of knowledge sharing including individual (enjoyment and self-efficacy), organizational (top management support, organization rewards) and technology factors (IT use).	Two individual factors and one organizational factor significantly influenced knowledge sharing.	Forms theoretical underpinning of knowledge sharing in part.
Choi & Lee 2000	Statistical analysis of samples from 58 Korean firms.	A model to examine the relationship between knowledge process and enablers (such as organizational context and technological context) towards organizational	Organizations could achieve the economic benefits by utilizing knowledge enablers and organizational creativity in an effective manner	Forms theoretical underpinning of knowledge sharing in part.

		creativity and performance		
Hau et al. 2013	Statistical analysis of a sample pf 2010 participants from multiple industries.	Knowledge sharing intentions can be tacit or explicit and the factors influencing these differ.	Organizational rewards have a negligible impact on tacit knowledge sharing, but significant positive influence on explicit. Reciprocity, enjoyment, and social capital have more effect on tacit sharing.	Background on knowledge-sharing processes.
Tseng & Kuo 2014	Survey of the knowledge-sharing practices of 321 members of large online teaching communities of practice.	Examined factors influencing the knowledge sharing of teachers.	Participation, expectations, and closer personal connections, along with self-efficacy, predicted knowledge sharing intent.	Background on knowledge-sharing processes.
Parke, Campbell & Bartol 2014	Experiment consisting of 644 participants within 161 virtual teams in a virtual team simulation.	Examined the ways in which team leaders can encourage team knowledge sharing.	Too much effort to structure the team in advance is detrimental, but practices like face-to-face kickoff meetings can help.	Background on knowledge-sharing processes.
Majchrzak et al. 2013	Meta-analysis of the existing literature on social media and knowledge sharing.	The effect of social media on knowledge sharing when used an organizational affordance.	Social media has mixed, contradictory effects. Can help knowledge sharing but also have unexpected, detrimental effects.	Background on knowledge-sharing processes.
Tamjidyamchol et al. 2013	Survey of information security professionals from large online venues like LinkedIn	Explored the effects of various factors on information security knowledge sharing.	Attitude, trust, and norms of reciprocity were strongly correlated to knowledge sharing intention	Background on knowledge-sharing processes.

3.1.3 Individual Creativity

Incubation has been distinguished as a segment of the creative process (Simonton 1999). For-example Amabile et al. (2005) highlighted that incubation process results in novel and useful ideas via unconscious recombination of individual ideas that were

stimulated via cognisant work. “Creativity is generally defined as the production of novel, useful ideas or problem solutions. It refers to both the process of idea generation or problem solving and the actual idea or solution.” (Amabile 1997)p.42). Hence, creativity indicates to the implementation of creative ideas in an incubator context. Given that the purpose of incubation relies heavily on the notion of taking locally developed innovations and applying them in industry (Mian 2016), creativity is both a desired outcome of an incubator, in the sense of creating more creative and innovative firms, and a part of the process because creativity is required to both develop the new ideas and determine how they are best applied (Patton 2014). Creativity comes in several forms, but in the context of this study, it is the individual dorm of creativity that is of greatest interest.

Previous studies highlight a range of conditions required for fostering individual creativity in general e.g. (Woodman, Sawyer & Griffin 1993b). Indeed, there is no current consensus on the most valid and reliable way of measuring individual creativity as of the time of this study, with most scholars choosing to take one of two positions (Park, Chun & Lee 2016). However, at an individual level, Amabile's extensive body of research proposes three major factors for individual creativity of employees within organizations: expertise, creative thinking skill, and intrinsic task motivation (Amabile 1998).

The literature attests to the importance of these factors. For example, expertise may contribute to creativity in unexpected ways; team members who exhibit considerable dissimilarity in expertise to other members of their team demonstrate statistically significant increases in individual creativity (Huang, Hsieh & He 2014). However, expertise dissimilarity presupposes that both members of the team have expertise to begin with, and so this also suggests the importance of expertise more generally. The

relevance of creative thinking to individual creativity is self-evident, but research indicates that focusing on the global or local level can significantly influence creative thinking (Zmigrod, Zmigrod & Hommel 2015), and one of the purposes of a technology business incubator is to determine how local innovation may be more globally applied, supposing the relevance of this dimension. Intrinsic task motivation—that is to say, the degree to which a person is predisposed towards a task due to personal enjoyment or preference for the task—has long been linked to creativity (Gerhart & Fang 2015). The proximity to academia, a traditional source of creativity and those predisposed to intrinsic motivation for their chosen discipline (Csikszentmihalyi & Wolfe 2014), makes this aspect of individual creativity especially relevant in the context of business technology incubators.

Thus, Amabile's individual creativity, comprised of the three factors of expertise, creative thinking skills and intrinsic task motivation, is adopted in this study (Amabile 1998). Since one of the roles of technology business incubators is to prompt greater innovation in new industry (Mian 2016), individual creativity is a highly relevant factor in understanding how technology business incubators perform and the theory of individual creativity underpins the study. Figure 3.1 shows the three components of individual creativity

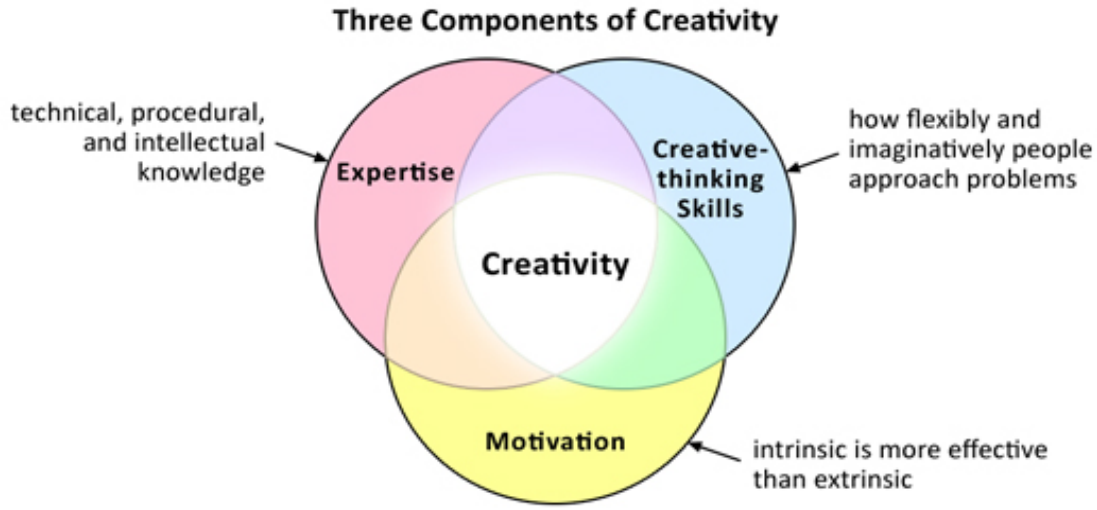

Figure 3.1: Three Components of Individual Creativity (Amabile, 1997)

Table 3. 3: Summary of Existing Studies Related to Individual Creativity

Source	Method	Idea of individual creativity examined	Findings	Relation to this study
Amabile 1997	Literature review and development of a conceptual model.	Understanding the ways of motivating creativity in the workplace on the part of individuals.	Three critical factors in individual creativity: expertise, creative thinking skill, and intrinsic task motivation	Theoretical underpinning for individual creativity
Mian 2016	Book, expounding on the general theory of the various types of business incubator and how they work.	Detailed the purpose and workings of business incubators, including their functions relating to creativity and innovation.	N/A	Background on incubation
Patton 2014	Literature review, qualitative study, and thematic analysis	The ability of technology business incubators to potentially influence the absorptive creative ability of tech firms.	Incubators improve firms by exposing them to innovation, fostering creativity, and creating useful interactions.	Background on individual creativity
Park, Chun & Lee 2016	Triangulation research to compare two measures of individual creativity using 1500 participants.	Individual creativity can be measured in an objective or subjective fashion; study sought to determine which approach is better.	Subjective methods have higher mean and variance but only a moderate correlation to objective methods.	Background on individual creativity

Huang, Hsieh & He 2014	Two quantitative studies, one of 200 team members of 40 R&D projects, the second with 82 members of 26 teams.	Examined the role of similarity and dissimilarity between the expertise areas of team members and the potential for dissimilar expertise to foster creativity.	When expertise is dissimilar, the tactic of knowledge sharing predicts individual creativity, while explicit knowledge sharing predicts creativity with shared expertise.	Background on individual creativity
Zmigrod, Zmigrod & Hommel 2015	Experimental design using Navon's global-local task design.	Examined the role of global and local stimuli in prompting creative responses from participants.	Divergent creative thinking was correlated with the local interference effect, while convergent creativity was predicted only by fluid intelligence.	Background on individual creativity
Csikszentmihalyi & Wolfe 2014	Literature review on the need for and benefits of creativity.	Looking at creativity in the context of education and taking a systems approach to individual creativity.	Creativity is increasingly needed in the modern context, especially since many problems in the present necessitate undoing the creativity of the past.	Background on individual creativity

3.1.4 Diffusion of Innovation

Innovation is widely considered as a significant factor affecting a firm's business performance. Diffusion of innovation theory denotes a variety of different dimensions which can be utilized to analyze the characteristics of new phenomena within an organization (Rogers 2003). That is to say, the diffusion of innovation denotes that innovation itself, like knowledge, can be diffused between different parties over time (Autant-Bernard, Fadairo & Massard 2013). In the diffusion of innovation model, only the innovative few initially adopt a new approach, and then the use of this innovation may spread from them to others (Zhang et al. 2015). Understanding the motivations and drivers of this diffusion and the determinant of the diffusion rate is one goal of DOI theory (Zhu 2014).

Spatial proximity is one of the documented causes of DOI between different organizations (Boschma 2005). Accordingly, it is reasonable to expect DOI to occur in the context of a technology business incubator, where many firms that aspire to innovation exist in a tightly clustered spatial region. However, this is only half of the diffusion process. Another aspect of DOI is the spillover of knowledge from science into industry. As with DOI within industry the spread of innovation from science into industry can be influenced by the proximity of industry to science (Autant-Bernard, Fadairo & Massard 2013). In this sense, incubators also enhance the likelihood of DOI occurring due to their proximity to their host universities. Thus, there is considerable reason to believe that business technology incubators have an effect on diffusion of innovation.

Within the proposed factor of DOI in the context of this study, there are three issues of particular interest: complexity (Okeke et al. 2017), compatibility, and relative advantage. These are the three factors presumed to affect how DOI occurs within the context of business technology incubators. The complexity of an innovation may have a strong influence on its likelihood of spreading because simple innovations are considerably easier to adopt, while more complex innovations may require external pressure (Zhu 2014). Compatibility is also a natural determinant in that, even if a new approach is clearly better, it will be considerably harder to adopt if it is incompatible with existing approaches and therefore requires significant retooling to implement (Sharp & Miller 2016). Thus, firms will consider compatibility seriously in adopting innovations, especially considering that incompatibility has a significant cost in time and equipment, as well as potentially the related expertise. Finally, relative advantage represents how much of an actual benefit the innovation offers. Even if an innovation is simple and easily compatible, it may not spread easily if firms do not perceive a

significant advantage inherent in its adoption compared to existing techniques (Arfken, Madeja & Owens 2015). Although other factors exist that may influence DOI, they were not chosen for inclusion in the present study.

As stated earlier, Diffusion of Innovation theory posits five innovation characteristics. relative advantage, compatibility, complexity, observability and trialability, of which this study adopts relative advantage, compatibility and complexity as they are considered the most significant constructs in relationship to incubator performance.

Table 3.4: Summary of Existing Studies Related to Diffusion of Innovation

Source	**Method**	**Idea of DOI examined**	**Findings**	**Relation to this study**
Rogers 2003	Book and development of theory.	Originated the theory of diffusion of innovation.,	Beginning of DOI theory	Theoretical underpinning for DOI dimensions of the study.
Sharp & Miller 2016	Literature review and model development.	Examined how the diffusion of innovation model could potentially be integrated into the life cycle model of research and development.	The diffusion of innovation idea can be rolled into the product life cycle to complement existing life cycle analysis approaches.	Background on diffusion of innovation.
Arfken, Madeja & Owens 2015	Mixed methods analysis of a 24-month trial of various synthetics.	Diffusion of innovation as a framework for comparing various synthetic substances.	Diffusion of innovation allows an understanding of how and why better ideas may not yet have been applied to all products.	Background on diffusion of innovation.
Zhu 2014	Comparative case study between the neighboring Chinese provinces of Sichuan and Tianjin.	Comparing the effects of mandated innovation versus championed innovation using the diffusion of innovation framework.	Certain classic hypotheses in the diffusion of innovation model must be modified to account for context.	Background on diffusion of innovation.
Okeke et al. 2017	Two in-depth case studies analyzed in conjunction with the English National Health Service.	How governance mechanisms in the complex context of healthcare networks affect diffusion of innovation.	Governance exerts a complex influence on the diffusion of innovation process, with both benefits and drawbacks.	Background on diffusion of innovation.

Autant-Bernard, Fadairo & Massard 2013	In-depth review of the existing empirical literature.	The interrelationship between the diffusion of innovation, Diffusion of knowledge and innovation policy in the context of Europe.	Ultimately, the search for universal policy tools to use with respect to innovation policy is unrealistic. Policy must be adapted to context.	Background on diffusion of innovation.
Zhang et al. 2015	29-month longitudinal case study including records from 25,616 patients and interviews with 125.	Diffusion of innovation framework applied to understand the slow spread of innovative approaches to e-healthcare.	Innovation is slow to diffuse for reasons such as poor advertising, lack of knowledge, incompatibility of new services with preferences, and participant limitations.	Background on diffusion of innovation.

3.1.5 Technology Business Incubator Performance

Regarding the performance of a technology business incubator, there is no particular defined explicated standard by which to measure incubator performance (Phan, Siegel & Wright 2005). There are several studies that have discussed different indicators to determine incubator performance (M'Chirgui 2012; Vanderstraeten & Matthyssens 2010). For example, Rothaermel & Thursby (2005b) examined the university-based incubators by the performance of tenant, revenues generated, total funds raised, venture capital funding obtained and whether the firm graduated, failed, or stayed in the incubator. This approach focused on success as defined in terms of how well the resulting businesses performed, a valid approach but not necessarily the ideal one. In general, although incubated firms are significantly more likely to succeed than non-incubated firms (Somsuk & Laosirihongthong 2014), the likelihood of failure remains high.

Therefore, rather than taking a firm-based approach to assessing the performance of a technology business incubator, a notion more firmly grounded in the program itself would seem more appropriate. In the vein of this, Mian (1997) defined four categories

of performance outcomes for university technology business incubators, which are (a) the program sustainability and growth, (b) tenant firm's survival and growth, and (c) contributions to the sponsoring university's mission, (d) community-related impacts. This approach is more holistic. Since the success or failure of incubated firms does somewhat reflect on the quality of the incubator (Tang et al. 2013), this factor is an appropriate part of defining performance. Success may be the overall goal of the incubated firms, but their success only partially reflects on the incubator program and is also only part of its own mission. However, the incubator is ultimately a part of the university running it (Wonglimpiyarat 2016). Therefore, it is appropriate that assessing its performance should consider a factor representing how the incubator program actually helps the host university. Additionally, since there is a strong emphasis on using local research innovations to develop local businesses in an incubation program (Mian 2016), it is also appropriate that a holistic measure of incubator performance should include a factor assessing how the program affects the community at large. If the incubator program failed to provide a positive impact on the local community, or created businesses with a detrimental effect on that community, this should be reflected in evaluating its performance. Finally, since establishing the incubator represents an investment on the part of the university, and requires that the program be maintained and expanded as needed (Patton 2014), the sustainability and growth factor is also an important part of understanding success. No matter how successful the incubated firms may be, it would be hard to consider an unsustainable incubation program a success.

Thus, giving due consideration for the literature supporting all of these factors, the researcher decided that a holistic approach to assessing incubator performance was the most appropriate for the study. Accordingly, in the context of the current study, the researcher used Mian's (1997) assessments of incubators' performance. This

multifaceted notion of performance captures more than just the success or failure of individual firms within the incubation program, making it a more comprehensive measure of performance and success than those models suggested by researchers such as Rothaermel & Thursby (2005a). This theoretical understanding of what it means for an incubator to be successful is an important underpinning of the current study.

Table 3.5: Summary of Existing Studies Related to Technology Business Incubator Performance

Source	**Method**	**Idea of technology business incubator performance examined**	**Findings**	**Relation to this study**
Mian 1997; (Hahn, Lee & Lee 2013)	Development of an evaluation framework for technology business incubators.	Four-factor model of incubator performance: (a) the program sustainability and growth, (b) tenant firm's survival and growth, and (c) contributions to the sponsoring university's mission, (d) community-related impacts.	Created the four-factor model.	Theoretical underpinning of the study on technology business incubator performance
M'Chirgui 2012	Case study assessment of business incubators in France 10 years after their development	Assessing the performance of technology business incubators in France.	Overall effectiveness cannot yet be judged, but the programs proved sustainable and able to develop.	Background on technology business incubator performance
Mian 2016	Book, expounding on the general theory of the various types of business incubator and how they work.	Detailed the purpose and workings of business incubators, including their functions relating to creativity and innovation.	N/A	Background on incubation
Tang et al. 2013	Comparative case study of technology business incubation approaches in India and China.	A comparative analysis of the performance and characteristics of technology business incubators in India and China.	The two contexts have similarities such as objectives, selection criteria, and basic services, but also differences such as ownership and legal status, specialist services, and funding.	Background on technology business incubator performance
Wonglimpiyarat 2016	Case study of various aspects of the business incubation	Examined the university business incubators and technology transfer	The incubation program is one of the major policy approaches used to	Background on technology business incubator performance

	approach used in Thailand.	strategies used in the case of Thailand.	support business innovation in Thailand.	
Patton 2014	Literature review, qualitative study, and thematic analysis	The ability of technology business incubators to potentially influence the absorptive creative ability of tech firms.	Incubators improve firms by exposing them to innovation, fostering creativity, and creating useful interactions.	Background on technology business incubator performance

3.2 Proposed Model

This research attempts to distinguish the influence of the knowledge-sharing process, individual creativity and diffusion of innovation towards technology business incubators' performance in Saudi Arabia and help the Saudi Arabian technology business incubators to better formulate the incubation process. Hence, this study examined the relevant literature concerning the most commonly cited theoretical models regarding both individual and organizational knowledge-sharing process factors. In addition, as discussed in the previous sections, this study shows the correlation of individual creativity (Amabile 1988) and diffusion of innovation (Rogers 2003) towards technology business incubators' performance.

The knowledge-sharing process includes two dimensions called knowledge donating and knowledge collecting (Lin 2007; Othman, Hawryszkiewycz & Kang 2014; Van den Hooff & de Leeuw van Weenen 2004). In other words, the process of transferring and creating knowledge which participants mutually perform. The literature reviews show factors for knowledge sharing are classified into individual and organizational dimensions (Connelly & Kevin Kelloway 2003; Lee & Choi 2003). Most frequently studied factors in knowledge sharing individual dimensions are: self-efficacy (Lin 2007; Wasko & Faraj 2005), enjoyment in sharing knowledge (Lin 2007), and interpersonal trust (Bijlsma & Koopman 2003; Davenport & Prusak 1998; Fukuyama 1995; Ma, Qi &

Wang 2008). For example, There is a model was developed to examine the influence of individual (enjoyment and self efficacy), organizational (top management support, organization rewards) and technology factors (IT use) on knowledge sharing process towards firm innovation capability Lin (2007). The findings show how organizations can foster a knowledge-sharing culture to maintain their innovation performance.

In addition, most frequently motivational factors in knowledge sharing organizational dimensions include: management support (Artail 2006; Riege 2005a; Song 2009; Yew Wong 2005), information technology infrastructure (De Vries, Van den Hooff & de Ridder 2006; Hsu 2008), and incentives and rewards (Bartol & Srivastava 2002; Davenport & Prusak 1998; Yew Wong 2005). For instance, Lee & Choi (2003) developed a model to examine the association among knowledge process and enablers (such as organizational context and technological context) towards organizational creativity and performance. The findings showed that organizations could achieve the economic benefits by utilizing knowledge enablers and organizational creativity in an effective manner. In addition, (Wang & Wang 2012) investigated the association among knowledge sharing, innovation and organizational performance. The results show that knowledge sharing and innovation speed have significant effects on financial and operational performance.

According to Amabile (1997), individual creativity of employees within organizations includes three major factors: expertise, creative thinking skill, and intrinsic task motivation.. Studies verify that the higher the creativity is if higher the level of each of these three factors. Thus, Amabile's individual creativity is adopted in this study.

Innovation has been widely considered as a factor of a firm's business performance. Diffusion of innovation theory denotes various dimensions that can be used to analyze

the characteristics of new phenomena in the organization (Rogers 2003). Diffusion of Innovation theory suggests five perceived innovation characteristics: relative advantage, compatibility, complexity, observability and trialability (Rogers 2010). In the context of this study, relative advantage, compatibility and complexity are used because they are considered as the most significant constructs in relationship to incubator performance. The researcher used Mian's assessments of incubators' performance (Mian 1996; Mian 1997). Figure 3.2 shows the proposed model for the current research and Table 3.6 presents the definition of each factor in the model.

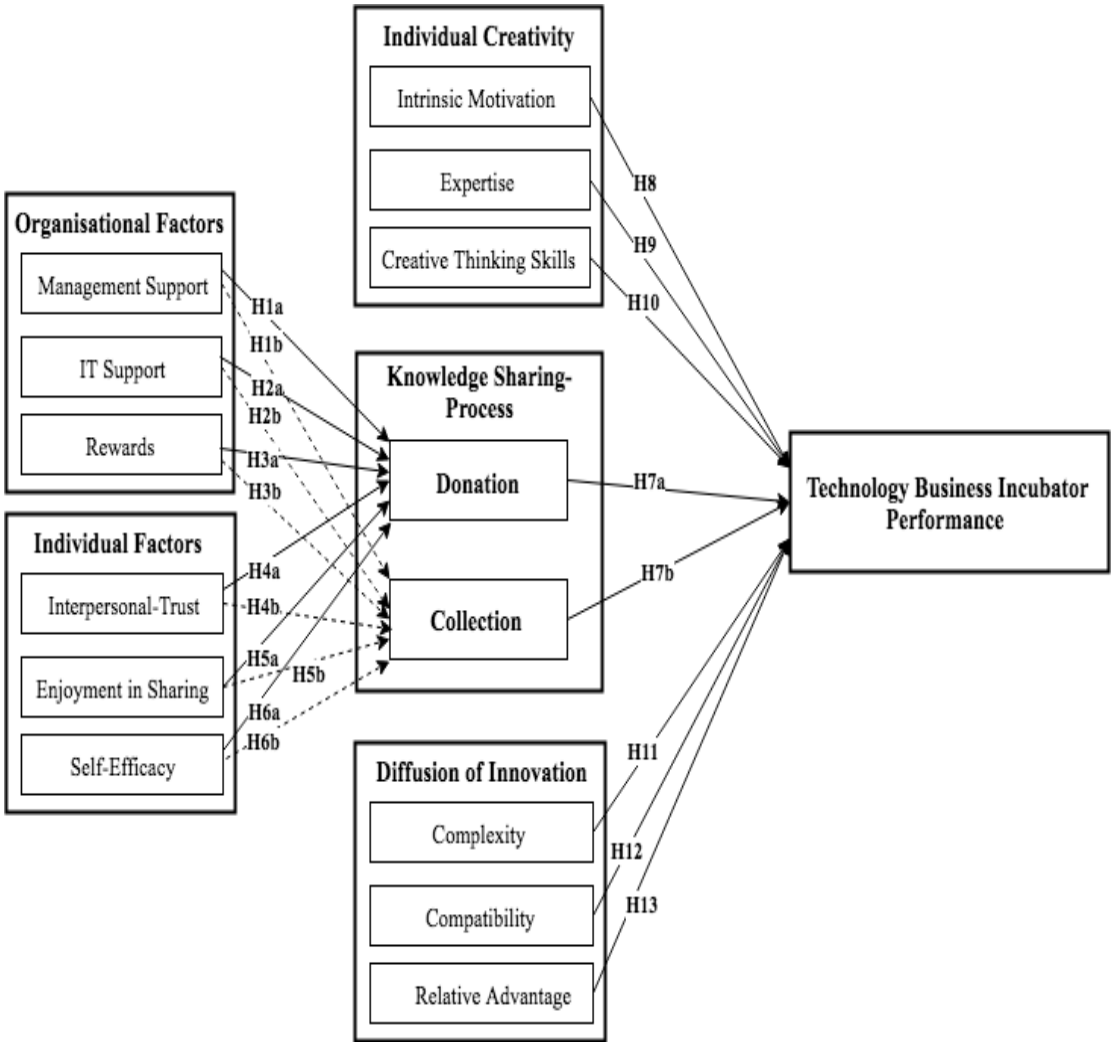

Figure 3.2: Proposed Model for the current research

Table 3.6: Factors Description

Factor	Description	Source
Knowledge - haring process	**Knowledge donating** is defined as "the process of individuals communicating their personal intellectual capital to others" while **Knowledge collecting** is defined as the "process of consulting colleagues to encourage them to share their intellectual capital."	(Lin 2007; Van den Hooff & de Leeuw van Weenen 2004)
Knowledge sharing individual factors	**Self-efficacy** is defined as the "judgments of individuals regarding their capabilities to organize and execute courses of action required to achieve specific levels of performance." **Trust:** refers to "co-workers having a good level of faith in each other in terms of intentions and behaviors." **Enjoyment in sharing:** refers to pleasure and joy in exchange of information among people	(Lin 2007; Politis 2003; Whitener 2001)
Knowledge sharing organizational factors	**Management Support:** "The degree to which the top management support the organizational climate of knowledge sharing by providing sufficient resources and influencing the employee willingness to share knowledge" **IT support:** This refers to the "level to which facilitating knowledge sharing through information technology use." **Rewards:** This refers to "the degree to which a reward system to share any new and creative ideas and effective knowledge sharing."	(Han & Anantatmula 2007; Othman, Hawryszkiewycz & Kang 2014)
Individual Creativity	**Expertise:** Expertise can be considered as skills of performing a specific task in the most effective and creative manner. **Creative-thinking skills:** This refers to the abilities or capabilities for innovative, cognitive and creative thoughts. **Intrinsic Motivation:** This refers to the passion and desire of someone to work on a specific task that is interesting, challenging and exciting for him.	(Amabile 1997; Hodge & Lear 2011; Lunenburg 2011; Phillips & Gully 2011; Wiseman & Hunt 2013)
Diffusion of Innovation	**Relative advantage:** refers to the potential advantage that could be achieved by users, if the innovation was applied **Compatibility:** It is about the extent to which innovation is considered as stable with current values. **Complexity:** This refers to the degree to which an innovation is perceived as comparatively difficult to understand and to use, and which could involve the ability of users, technical skills conditions and technological requirements, etc.	(Fennell & Warnecke 2013; Othman, Hawryszkiewycz & Kang 2014; Rogers 2003, 2010; Sahin 2006; Seemann 2003)
Technology Business Incubator Performance	Performance Outcomes • Program growth and sustainability (such as, growth in budget, space, facilities, services, tenants and staff) • Tenant firm's survival and growth (such as, sales growth, employment growth) • Contributions to sponsoring university's mission • Community-related impacts (such as, sales, revenues, taxes, exp, and graduate's employment	(Mahmood, Jianfeng, Jamil, Munir, Jintao, et al. 2015; Mian 2016; Mian 1996; Mian 1997)

	etc.)	

3.3 Hypotheses Development

3.3.1 Motivational Factors for Knowledge Sharing – Organizational Dimensions

Management support: Effective use of knowledge implicates the involvement of leadership related with the vision (Han & Anantatmula 2007). Management support is important in promoting knowledge sharing culture (Riege 2005; Artail 2006). According to Wong (2005), the leader is a role model for showing the knowledge sharing behavior in organizations. In addition, leadership affects knowledge sharing behavior such that managers need to encourage and guide staff participation in knowledge-sharing activities (De Vries, Van den Hooff & de Ridder 2006; Song 2009). Hence, the literature overall suggests the following hypothesis:

H1a-b: Management support has a significant positive impact on the knowledge-sharing process (a-donation and b-collection) in Saudi technology business incubators.

Information technology (IT) support: Information technology support is important in knowledge flows that improve the facilitation of sharing of knowledge (Hsu 2008). For-example, IT infrastructure that consists of hardware and software used to support staff in sharing knowledge (De Vries, Van den Hooff & de Ridder 2006), and enhance the scope and timeliness of knowledge sharing (Ardichvili, Page & Wentling 2003). For that reason, staff adequate training is encouraged to apply technology in knowledge

sharing (Han & Anantatmula 2007). Therefore, although there are some potentially contradictory results in the literature that suggest that technology may actually exhibit more of a mixed effect (Majchrzak et al. 2013), the literature overall suggests the following hypothesis:

H2a-b: Information Technology has a significant positive impact on the knowledge-sharing process (a-donation and b-collection) in Saudi technology business incubators.

Rewards: It is recommended to use **i**ncentives and rewards in order to motivate staff in contributing to knowledge sharing adoption (Yew Wong 2005). The sharing of knowledge by individuals has the possibility to improve team performance and, in turn, increase the personal rewards received (Bartol & Srivastava 2002). Incentives and rewards support staff in order to share knowledge (Bock & Kim 2001). Incentives such as those having monetary and non-monetary value (Bartol & Srivastava 2002) have immediate impacts of motivation for knowledge sharing with colleagues (Kharabsheh 2007). Accordingly, the literature overall suggests the following hypothesis:

H3a-b: Rewards have a significant positive impact on the knowledge-sharing process (a-donation and b-collection) in Saudi technology business incubators

3.3.2 Motivational Factors for Knowledge Sharing – Individual Dimensions

Interpersonal Trust: Studies showed that trust among staff can encourage collaboration (Bijlsma & Koopman 2003) and individuals are more motivated towards providing useful knowledge when there is an interpersonal trust. Without trust, individuals may become less willing to share knowledge with others (Davenport & Prusak 1998; Ma, Qi & Wang 2008). Therefore, interpersonal trust increases individual's inclination to engage in knowledge sharing activity (Fukuyama 1995).

Furthermore, trust on both sides of the knowledge-sharing process may be necessary for successful knowledge sharing (Pinjani & Palvia 2013). Thus, the following hypothesis is proposed:

H4a-b: Interpersonal trust has a significant positive impact on the knowledge-sharing Process (a-donation and b-collection) in Saudi technology business incubators.

Enjoyment in sharing knowledge: Previous studies show that employees are inherently interested to donate knowledge because of enjoyment in helping others (McLure Wasko & Faraj 2000; Wasko & Faraj 2005). Thus, employees may be more favorable oriented towards knowledge sharing in terms of both donation and collecting (Lin 2007). Therefore, the literature overall suggests the following hypothesis

H5: Enjoyment in sharing has a significant positive impact on the knowledge-sharing process (a-donation and b-collection) in Saudi technology business incubators.

Self-efficacy: Self-efficacy is the individual's judgment of his or her ability to organize and execute successful performance of everyday tasks according to the rules (Lin 2007). An individual's sense of self-efficacy is shaped by their tendency to undertake actions, such as those regarding level of problems, expressed interest, tenacity and the effort required to complete a task (Bandura 1997; Gist 1987; Gist & Mitchell 1992). (Lin 2007) discusses that knowledge-sharing influences can enhance the performance of organizations via an increase in staff readiness to donate and collect knowledge. Thus, the literature overall suggests the following hypothesis:

H6a-b: Self-efficacy has a significant positive impact on the knowledge-sharing process (a-donation and b-collection) in Saudi technology business incubators.

3.3.3 Knowledge-Sharing Process

Effective knowledge processes can facilitate the significant organizational intellectual capital and intangible resources necessary to improve performance (Nold 2012). For example, when workers transform their tacit knowledge into explicit knowledge, this will benefit the entire organization (Erickson, Rothberg & Carr 2003). In other words, when organizations manage their knowledge assets better, then they have greater opportunity for better performance in the market (Erickson, Rothberg & Carr 2003; Rahab 2011). Therefore, the literature overall suggests the following hypothesis:

H7: Incubatees' willingness to share knowledge (a-donation and b-collection) has a significant positive impact on technology business incubators' performance in Saudi business technology incubators.

3.3.4 Individual Creativity

Studies highlighted that higher the level of each of the Amabile's (1997) individual creativity factors (Such as, expertise, creative thinking skill, and intrinsic task motivation, the higher will be the creativity within organizations: Creativity creates a superior performance (Grewal, Levy & Kumar 2009). Researchers have suggested that has vital impact on organizational performance (Grewal, Levy & Kumar 2009; Oldham & Cummings 1996). It is suggested that individual creativity is positively related to technology business incubator performance. Accordingly, the literature overall suggests the following hypothesis

H8: Intrinsic motivation has a significant positive impact on technology business incubators' business performance in Saudi technology business incubators.

H9: Expertise has a significant positive impact on technology business incubators' performance in Saudi technology business incubators.

H10: Creative thinking skills have a significant positive impact on technology business incubators' performance in Saudi technology business incubators.

3.3.5 Diffusion of Innovation

Innovation is a mean for achieving and sustaining competitive advantages and business outcomes for business organizations. It has been highlighted that the lack of innovation capacity and performance in organizations means no growth and competitiveness(Scholl 2005; Yeşil, Koska & Büyükbeşe 2013). Panuwatwanich, Stewart & Mohamed (2008) showed diffusion of innovation has significant effect on business performance. In today business world, competing based on products and services is based on the underlying capabilities that make the products and services possible (Egbetokun, Siyanbola & Adeniyi 2007). However, the complexity factor of diffusion of innovation may potentially stymie the diffusion, because more complex innovations are more difficult to diffuse and may be less attractive (Zhu 2014). Thus, the following hypothesis is proposed:

H11: Complexity has a negative impact on technology business incubators' performance in Saudi technology business incubators.

However, compatibility with existing paradigms or preferences makes innovations significantly easier to diffuse, according to the literature (Zhang et al. 2015). Therefore, the following hypothesis is proposed:

H12: Compatibility has a significant positive impact on technology business incubators' performance in Saudi technology business incubators.

Finally, the strength of the relative advantage offered by an innovation is a significant predictor of the value placed upon it (Arfken, Madeja & Owens 2015). Thus, the following hypothesis is proposed regarding the relative advantage aspect of DOI:

H13: Relative advantage has a significant positive impact on technology business incubators' performance in Saudi technology business incubators.

3.4 Chapter Summary

This chapter includes the building of the research's conceptual model based on related studies and supporting theories. The proposed research conceptual model (Figure 3.2) integrates the knowledge-sharing process, including its individual and organizational factors, individual creativity and diffusion of innovation in regard to Saudi Arabian technology incubators' performance. In order to answer the research questions, 13 hypotheses were developed in guiding this research. The adopted research methodology of the study is presented in the next chapter (Chapter 4).

CHAPTER 4: RESEARCH METHODOLOGY

This chapter presents the research methodology that was used in the current study study. This chapter starts by providing an explanation for the adopted research design for the current study that includes two stages. The first stage employed quantitative via survey questionnaire. The second stage employed qualitative approach through case study technique. This chapter also includes instruments that were used for study with presented evidences, sample description and data collection procedure.

Research Paradigm

The research design of study provides the framework guiding the research study to be conducted. This framework helps answer the research questions of the study (Cooper, Schindler & Sun 2011). Additionally, the research design has another value that is to ensure that the collected data of the research is sufficient to afford answers for the research questions appropriate and clearly (Vogt 2010). For any research, the research design is essential as it provides a roadmap for the researcher towards accomplishing the aims of study. Also, it directs the research proceeding on the way discusses the hypotheses of the study and research questions by providing a reasonable flow chart outlining the stages from the beginning to the end.

Understanding the hypothetical issues guiding the exploration worldview is essential. This help to empower attractive outcomes resulted from the activities of research (Easterby-Smith & Thorpe 2002). The current study explores the relationships between numerous factors on the context of technology business incubator performance. Therefore, the study is considered as applicable to social research. Sociology research has two approaches that are positivism and interpretivism (Easterby-Smith & Thorpe 2002; Tsang 2014). Positivism is about generating a new hypothesis based on the

current ones and stating the exact objectives facts of individuals' behavior for confirming the theories (Kreuger & Neuman 2006; Neuman 2013). Interpretivism is about exploring the reason fact of having various encounters and perceptions by individuals in order to elaborate their conduct (Easterby-Smith & Thorpe 2002).

The strategies the research follows are either quantitative or qualitative. Positivism approach has been applied though quantitative method. It approaches the actual strategy for data examining and interpreting the information as statistical data so the findings can be summed up to wider populace (Mitchell & Bernauer 1998). An interpretivist approach has been applied through qualitative method. The qualitative method focus on human interaction or social issue (Creswell et al. 2003).

Therefore, this study utilizes a mixed research methods including quantitative and qualitative method as a research technique in order to consider positivist and interpretivist strategies to deal as accurately as could rationally be estimated by the issue under scrutiny (Kreuger & Neuman 2006). The quantitative method (positivism) is the main methodology for this study and the qualitative method (interpretivism) is then conducted to support and validate the findings from the investigation of the quantitative method. In the beginning, in order to build a rational model and theories, entrenched hypotheses and relevant literature through the positivism way were evaluated. The rational model was measured by using quantitative research progression in order to elaborate pervasive concerns related to the research context. A study technique was applied to measure the conducted model. Then, interpretivism (qualitative method) was used to provide a better understanding of the way the applied model is pertinent to the issues under scrutiny.

4.1 Research Design

This research employed mixed methods research approach that includes quantitative and qualitative methodology in order to do both answering the research questions and testing the hypotheses of the study. The research methodology of this research consists of two stages. Stage 1 of the research methodology applied quantitative research method through collected data from survey instruments. Stage 2 the research methodology is a qualitative research method that was conducted through a case study approach. The qualitative research method was utilized in order to validate the quantitative results. In this research, an interpretive exploration approach was applied by the researcher for the case study. The purpose of using interpretive research studies is in order to know the concepts of the research through meanings presented by the authors (Schwartz-Shea & Yanow 2013; Yin 2009). In information systems field, the aim of interpretive research approaches is finding out information systems and their influencing factors (Mills, Durepos & Wiebe 2009). Figure 4.1 shows the the proposed research design of the current study.

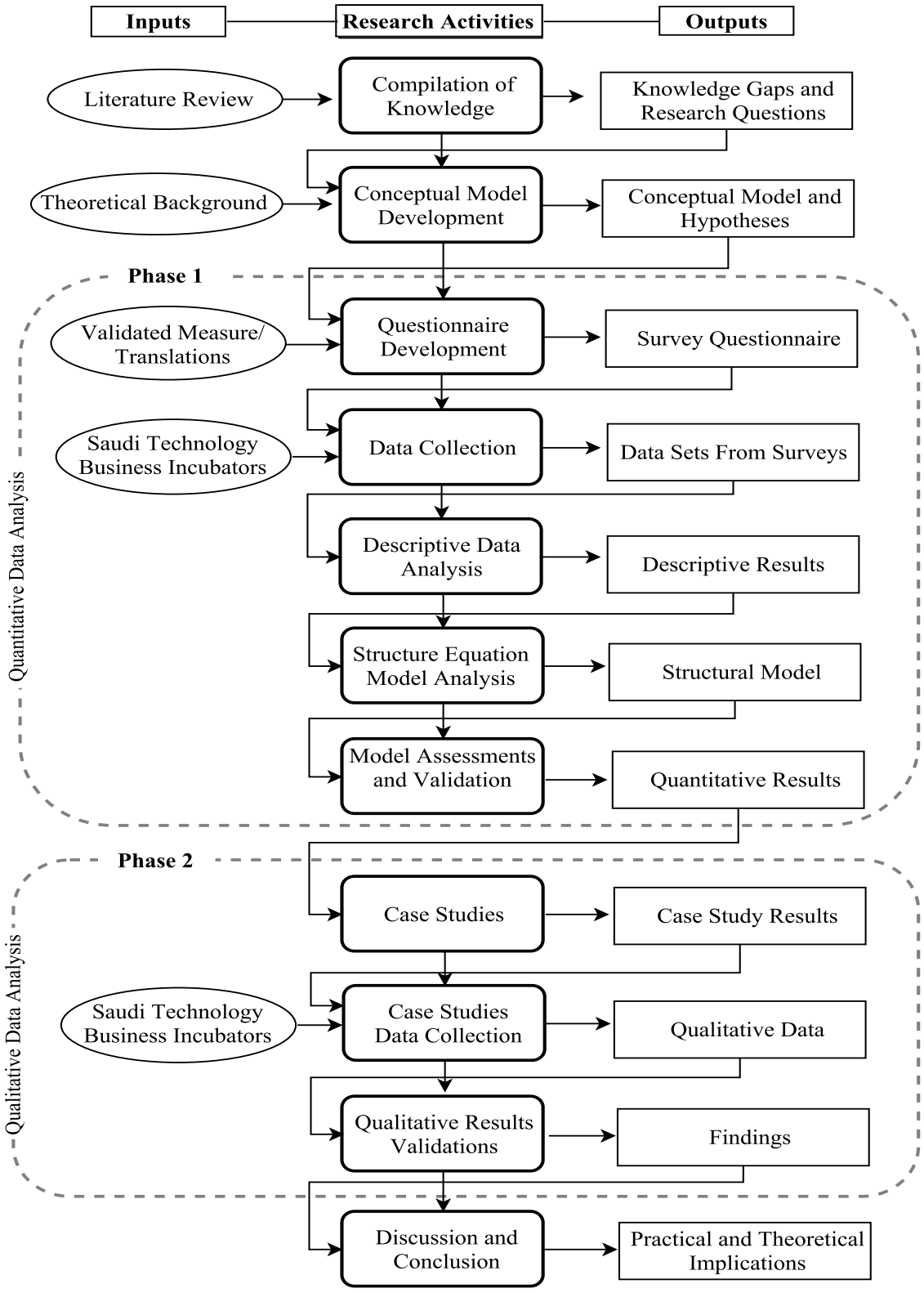

Figure 4.1: Research Design

In the study's early stages, a comprehensive literature review was conducted in order to determine the knowledge gaps in the existing research. This is an essential step to guide the researcher to posit the research questions. After that, based on the hypothesis in the existing literature, a theoretical conceptual model was conducted in order to respond to the questions of the current research. The conceptual model of the study consists of variables that were investigated to proceed to questionnaire development. In the quantitative research method (Stage1), previous validated instruments were reflected on the created questionnaire for the survey. After that, statistical analysis was applied in testing the hypotheses and answering the research questions, which is a descriptive and measurement scale analysis. is. In the qualitative research method (Stage2), semi-structured interviews were conducted in order to test theoretical conceptual model and validate the results of the quantitative stage. Then, the findings and implication of the study were discussed. Finally, the study concludes.

One of the most important stages in the life cycle of research is the literature review stage that is a continuing process. The knowledge compilation stage of this study included conducting comprehensive literature review of the dimensions of this study that are knowledge sharing, creativity, diffusion of innovation and incubators. The more research proceeded, the more focused the literature review became. In this stage, defining the research borders in a clear way is essential in order to investigate the influence factors of the knowledge-sharing process (donation and collection), individual creativity, diffusion of innovation towards technology business incubators' performance.

After the gap and research borders had been identified, the study proceeded in developing research questions and hypotheses of the study. As mentioned previously,

the purpose of the research is answering these questions, a conceptual model was proposed (detailed in Chapter 3). The foundation of developing the hypotheses was identifying factors and interrelationship of these factors in the literature review. This step was fundamental for the next step which is developing the survey questionnaire.

A questionnaire instrument was then developed which involves a quantitative empirical investigation, where an evaluation for each item on the survey questions is conducted based on its relevancy and consistency with each definition in the model. After the survey questions had been designed, data collection process was conducted in Saudi technology business incubators. Then, the results of the survey questions part (quantitative data) were analyzed followed by analysis of the findings of the interview part (qualitative data) in order to validate the model of the study. Finally, an interpretation for the results was preesnted accordingly in order to evaluate the hypothesis and the results of the study. Also, the implications are presented.

4.2 Phase 1: Quantitative Data Analysis

4.2.1 Research Instrumentation/Measures

Research recommends that using previously validated survey instruments rather than developing new ones to accelerate confirmation of reliability and validity (Bélanger & Crossler 2011). Thereafter, the validated survey instrument was previously revised and to ensure that the content of the survey measurement items/ variables was sufficient and representative for the purpose of the study, thereby adding to content validity. The constructs of the proposed model were measured utilizing group of items through five-point Likert-scale statistical measures (ranging from 1 = strongly disagree to 5 = strongly agree). All observable indicators and items that are utilized in this study are listed in Appendix A.

4.2.2 Instrument Translation

In this survey, the implemented scales were initially provided in English. However, there was a need for translating survey into Arabic so they could be used in Saudi Arabian technology business incubator; Arabic is the most common language is used there. A High quality of the interpretation is important to guarantee that practical equivalence between the items in the English version and the Arabic one, a forward interpretation process with subjective evaluation was used as recommended by (Bates & Khasawneh 2005; Sperber, Devellis & Boehlecke 1994). Then, pilot test was applied on the final draft of the survey (English/Arabic). The survey was sent to a group of 10 specialists whose mother tongue is Arabic, but they use English in their communications in their institutes. The point of generating Arabic version for the survey is the useful comparability can be used instead of providing a typical word-by-word interpretation for the English version.

Forward Translation

An Arabic certified translating agency translated the survey from English to Arabic. The translators from the agency was instructed to keep the meaning of the survey content as close as possible to the English one. The content of the English survey was compared with the translated one by the translators line by line in order to ensure the accuracy of the translation, and the final draft of the survey includes the most accurate interpretation.

Subjective Evaluation

After the survey had been interpreted, the researcher evaluated the final interpreted version. This step is important after the first stage of interpretation to ensure that exact meaning of English survey had been interpreted to Arabic correctly without losing the

significant meaning of the items that may affect the purpose of the study. Indeed, the survey was sent back to the interpreters because there were significant contrasts between the two versions of the surveys (English and Arabic). Thus, the interpreters could make another review to revise the survey to the best interpreted meaning until the satisfaction of the researcher was accomplished.

4.2.3 Sample and Sample Size

The population of this study is incubatees and key position staff at technology business incubators in Saudi Arabia. Defining the appropriate sample size of this study is crucial to the reliability and validity of the study (Wolverton 2009). There are general guidelines have been proposed by numerous structural equation modeling (SEM) scholars in order to evaluate assumed sample size for the SEM technique. For instance, Hair et al. (2006) proposed five points that may have an effect on the required sample size for SEM statistical analysis. These five points are presented as following:

- The multivariate distribution of the data
- The estimation method
- The complexity of model
- The measure of missing data
- The amount of average error variance among reflective indicators.

Regarding this, Hair et al. (2006) found that between 200 to 400 for 10 to 15 indicators is the sample size utilized by SEM studies in general. The current study utilized a sample of 340 respondents for the survey.

4.2.4 Data Collection

The data collection method is survey, which provides a numeric or quantitative trends description of population's opinions and attitudes based on studying a sample of this population (Creswell 2003). Babbie (2013) states that "surveys are particularly useful in describing the characteristics of a large population because they make large samples feasible" (2012, p.7).The survey was initially produced in English for this study. As Arabic is the common language in Saudi Arabia, the survey was translated in Arabic as well. The survey questions applied closed-ended questions technique. In this technique, a small set of participants produces accurate answers. The participants are asked to select or rank answers instead of to responding to the questions or providing their expressing their opinions. In order to get a high response rate for the survey, there are some techniques were applied. First, designing the survey considered that 14 minutes as a maximum time to complete it. Second, using the procedures proposed by Sekaran (2003):

- Making the survey brief as much as possible
- Introducing the participants to the research objectives and the significance of the survey to the study by providing a cover sheet including this information.

Primarily, an online version of the survey was utilized in order to collect data responses from the respondents. The online survey (web-based) was directed utilizing Qualtrics software. However, the rate response to the online survey as poor. Therefore, a paper-based survey was disseminated with an assistance from representatives working in Saudi Arabian technology business incubators. Calibrating with these representatives in the incubators, the paper-based surveys were distributed in different workshops held by in the incubators to those of the incubatees who hadn't participated in the online survey.

After completing by the surveys, the completed surveys were turned in to the administrator concerned. Follow up calls were placed around ten days after introductory contact.

Data collection was lasted from November 2016 to March 2017. Surveys were sent to over 400 participants but 346 completed and returned the survey, including the online ones. Subsequently, incomplete surveys were removed so 340 surveys were utilized for data analysis.

4.3 Quantitative Data Analysis Approach

After the data had been received, specific statistical procedures were applied in order to analyze the gathered data. The main goal of data analysis part is addressed in three primary points: checking the data the if there is a tendency or dispersion; reliability and validation measuring in testing the data sufficiency; and testing the hypotheses of developed model of this study (Sekaran 2003).

A variance-based structural equation modeling (SEM) statistical technique was applied for data analysis, using Partial Least Squares (PLS) SmartPLS version 3 (Sarstedt et al. 2014) for examining the relations between the various factors of the model presented in this research. SEM tests theoretical models through theory testing in order to understand the concurrent displayed relations between numerous independent and dependent variables. One of the best-known analysis techniques is the partial least squares (PLS-SEM) approach as it is a preferred investigation method in data frameworks and business research for providing several flexibilities. This approach is suitable for prediction-oriented research, does not require a huge population, does not require ordinariness and along these lines works without distributional suppositions and with ostensible, ordinal and interval-scaled variables (F. Hair Jr et al. 2014; Haenlein &

Kaplan 2004). Phase 1 of this study (quantitative analysis) experienced through three stages that are Descriptive Data Analysis, Measurement Scale Analysis and Structural Equation Modeling (SEM). These three stages will be more detailed in the next following sections.

4.3.1 Descriptive Data Analysis

The descriptive data analysis of the study was directed utilizing the SPSS (Version 22.00) software for discovering that preparation of the data by compiling the descriptive data. This step is important in order to progress next step that is multivariate data analysis. This investigation consisted of respondents' profiles' research and data screening through studying normality, means, standard deviations and standard error of the mean were implemented for examining the central tendency and the data dispersion. The outcomes of this stage are provided in Chapter 5.

4.3.2 Measurement Scale Analysis

In order to capture the meaning of each construct model, measurement scale analysis was conducted via reliability assessment and validity. For this propose, there are some assessments and analysis techniques were conducted. For measuring reliability, a Cronbach's alpha assessment was applied. This assessment demonstrates the constancy of the responses across the items in the Likert scale. For measuring reliability and validity, the analysis of factor and Cronbach's alpha were utilized. Finally, in this stage, the hypotheses of the study were tested by using numerous statistical analysis, such as correlation analysis used for assessing the degree to which particular items/variables/constructs belonged to its scale to find out the impact of diverse factors in each. Moreover, in addition, item-total correlations were used to assess the degree to which a particular item belonged to its scale.

Two factor analysis techniques were conducted in order to confirm the validity of the measurement scale. First, exploratory factor analysis (EFA) provided an appropriate number for each factor of the constructs of the model. The second was confirmatory factor analysis (CFA), confirming identified structures of the factors as well as further strengthening the validation of every construct and its factors. It has been proven that the best analysis techniques for testing how well a predetermined (hypothesized) structure of factor matches the actual data is confirmatory factor analysis (CFA) (Hair et al. 2006). Additional details and findings of measurement scale analysis are provided in Chapter 6.

4.3.3 Structural Equation Modeling (SEM)

After the measurement model had been confirmed, the connection between the latent constructs was constructed to signify the relationships in the various hypotheses in the structural model. There are some causal relationships in the research model. In order to investigate these causal relationships, the partial least squares structural equation modeling (PLS-SEM) method was utilized (Hair et al. 2006). Unlike first-generation statistical techniques. For example, techniques are regression analysis and variance and second-generation of SEM multivariate analysis technique of analysis. The first-generation techniques limitations are overcome by these techniques (Haenlein & Kaplan 2004). The purpose of using SEM as an extension of the previous technique of the analysis of the factor is to support integrating path analysis and factor analysis through including two points in these procedures: confirming the measurement of the model and fitting the structure of the model, following the CFA and via path analysis (Ullman & Bentler 2003). Additionally, there are other techniques of SEM are used in this study, such as LISREL and SPSS-AMOS. These techniques are not appropriate for certain

types of study since they only deal with reflective factors (Henseler, Ringle & Sinkovics 2009a). The proposed model of this research includes both formative and reflective factors. Therefore, PLS-SEM is suitable for this research as it provides the simultaneous assessment for both formative and reflective factors (Chin, Marcolin & Newsted 2003).

The path coefficients significance was assessed in order to evaluate the hypotheses. This significance identified by utilizing the t-statistical estimated with the bootstrapping method (with 5,000 sub-samples). Bootstrapping method can be performed by SmartPLS 3. Testing the significance of coefficients, such as outer loadings, outer weights, and path coefficients are performed in applying a nonparametric method through evaluating standard errors for the evaluations (Sarstedt et al. 2014) , for both the inner and outer model to specify the t-value for significance For the significance test, to get approximate t-values, it is better for researchers to use a huge sub-samples like 5000 from the original one to design a standard error, and both numbers of cases and observations in the original sample should be symmetric (F. Hair Jr et al. 2014). According to (Hair, Ringle & Sarstedt 2011), the two-tailed test have critical t-values are clarified as follows:

- 1.65 (significance level = 10%)
- 1.96 (significance level = 5%)
- 2.58 (significance level = 1%)

In this study, the significance level was applied for the two-tailed test is 5%. In order to measure the predictive power of the model of the research, the R^2 value was utilized in measuring the percent of the variance clarified through the independent constructs in the structure of the model (Chin 1998) . In the structural model, in endogenous latent

variables, R^2 values (0.75, 0.50, or 0.25) can be explained as substantial, average or weak, respectively (Hair, Ringle & Sarstedt 2011). The analysis of SEM and findings are detailed in Chapter 6.

4.4 Phase 2: Qualitative Data Analysis

The main purpose of using the qualitative research method in this study is to validate the findings that was produced by the quantitative phase. For example, statistical analysis evaluated and refined the conceptual model of the study. According to (Myers 1997) (p.241) ”Qualitative research involves the use of qualitative data, such as interviews, documents and participant observation to understand and explain social phenomena”. The outcomes of the analysis produced that the conceptual model of the study represented the actual phenomena within Saudi Arabian technology business incubators. In the current study, case study technique was directed based on the analysis of the qualitative approach, which is generally used as a part of social studies research(Yin 2011). This technique is preferred for this study; it is suitable for this kind of research. In addition, this type of case study (explanatory case study) served for validating the model of the research for generalization purposes (Sekaran 2003).

In order to achieve this, the objective of the current study purposive instead of statistical. Therefore, the generalization of the model of the research could not be fully completed by the statistics phase. Regarding supporting the generalization, implementing multiple case studies was applied through the template of developed model. In order to support the generalization, multiple case studies were implemented using the developed model template, the outcomes of which were compared to find whether the same findings and results were reliable (Yin 2011). The findings of this stage enhanced the understanding of how well the research model measured technology business incubator performance in Saudi Arabia.

4.4.1 Case Study Design

As Yin (2013) stated, either a single case study or multiple cases can use the case study approach. The single case study is more likely for concentration basic cases or one-of-a-kind conditions while multiple case studies are plural that have a higher cost and tedious. The multiple cases consider replication rational, where there is a similarity or discrepancy in the results from the studies. Multiple cases approach was applied on this study since replication rational was utilized to succeed analytical generalization. In this study, the selection of incubators (case studies) was based on same as the standards were used in the stage of statistics.

According to Yin (2009), the purpose of using case studies method is explaining or describing the actual phenomena in the context which they occur. For example, the case study technique is well informative and critical in capturing more information one explanatory on how, what and why questions. There are three types of classifications for case study technique. First, it can be exploratory case study that consecrates on theory and the development of hypotheses. Second, it can be descriptive case study that emphasizes on the results or any collected data about a state. Finally, it can be explanatory case study focusing on the concepts and hypothesis evaluation. In the current study, exploratory case study technique was applied in order satisfy the goal of confirming the model of the research resulted from the evaluation stage. According to Creswell & Clark (2007), selecting an appropriate qualitative research method (case studies) is not relayed on assumptions. In case the context and boundaries of the research are ambiguous, the case study technique benefits in exploring evidences in terms of actual life (Yin 2011).

4.4.2 Data Collection

The data collection approach for case study used for this study is interviews with key position staff in the selected Saudi Arabian technology business incubators. In the case study approach, the main sources which can be informative are interviews (Yin 2013). Semi-structured interviews technique was applied in this study in order to direct the interviews. The interview questions are provided in Appendix …. All interviews were conducted in person (face to face) and digitally recorded in order to resolve any confusion matters. A documentation method was utilized that focused on relative organizational and demographic background information in order to support the relative details of the organizations. Informed consent was provided to the participants by the researcher. This is essential with information about the research including research problem and research method, research significance and the nil/negligible risks associated while conducting interviews (see Appendix B).

4.4.3 Qualitative Data Analysis Approach

Qualitative data analysis includes different procedures that evidences satisfies the objectives of the current study. These procedures include examination, categorization, classification and testing. A direct interoperation analysis method was applied in this study. In order to ensure that the outcomes address and deal with the research questions, each hypothesis was addressed in a chorological report provided by the researcher. The findings of the qualitative data analysis are compared and contrasted the results of quantitative data in order to fully understand the findings. Chapter 7 includes the qualitative findings (case study analysis).

4.5 Ethics Consideration

In this research, human participants are involved for the data collection purpose. In order to ensure both the integrity of the research methodology and the anonymity and ethical participants' protection, the Human Research Ethics Committee (HREC) – University of Technology Sydney guidelines were applied. Also, an ethical approval from HREC [Ethics approval: UTS HREC TH16-0548] was obtained for the research approach methods of this study (quantitative and qualitative method).

4.6 Chapter Summary

This chapter provided the research methodology that was utilized for this study. The adopted research design of the current study has been clarified. It includes two stages that were addressed in this chapter. The first stage of the study is the quantitative research method approach, was provided. Then, stage 1 was followed by description of stage 2, which is based on a quantitative research method approach.

CHAPTER 5: DESCRIPTIVE QUANTITATIVE DATA ANALYSIS

This chapter presents the descriptive data analysis. First, all the details about the questionnaire are presented followed by participant's profile. This is followed by verifying the characteristics of data, including missing and normality of data. Then, it describes the reliability assessment of each items used in the current study. Finally, the chapter is concluded.

5.1 Survey Method

This study applied survey method in order to collect numerical data from participants in technology incubators in Saudi Arabia. As discussed in Methodology Chapter 4, survey method is the most appropriate way to collect data for the current study because it is the quickest and most reliable method for data collection. A hard-copy questionnaire survey was handed to the manager to distribute to employees who worked in the selected university incubators, including the King Abdullah Bin AbdulAziz Science Park (KASP), the King Saud University Science Park (KSSP), the King Abdul Aziz City for Science and Technology (KACST), as well as BADIR-ICT, Umm Al Qura University Institution of Innovation and Entrepreneurship, and Business Incubators and Technology Center in Royal Commission for Yanbu. The survey was also posted online to participants through the Qualtrics website, who's URL was embedded in email for participants, calling for their survey participation.

Data collection took place from November 2016 - March 2017. This study adopted previously validated instruments so as to ensure the measures were both adequate and representative. The survey was originally conducted in English; however, a translated

Arabic version was also included. Participants were required to complete a closed-ended questionnaire on the five-point Likert scale (1=strongly disagree to 5=strongly agree) is used. The five-point Likert scale is recognized one of the best commonly used methods of scaling responses in the design of the survey.

Over 400 participants were contacted, but only 376 participated in the survey. After removing incomplete responses, in total 340 responses were collected. All participants were asked to respond to all measures, such as the knowledge-sharing process, individual creativity, and diffusion of innovation.

5.2 Participants' Profile

An assessment of the respondent's profile is performed to reveal the ability of the sample to adequately reveal the survey population. The demographics details are follows.

Gender

This distribution of gender (male and female) is fairly representative of the population of incubatees in the selected technology business incubators in Saudi Arabia. As shown in Table 5.1 and Figure 5.1, 62% was males and 38% was females.

Table 5. 1: Gender

Gender	**Frequency**	**Percentage (%)**
Male	210	61.76
Female	130	38.24
Total	**340**	**100**

Age

As shown in Figure 5.2 and Table 5.2, 155 participants (45.5%) are 26-35 years old, followed by 110 (32.5%) 36-45 years old. Then 60 (17.6%) were 18-25, followed by 15 (4.4%) above 45 years old.

Table 5. 2: Participants' Age

Age in years	**Frequency**	**Percentage (%)**
18-25	60	17.6
26-35	155	45.5
36-45	110	32.5
46 or above	15	4.4
Total	**340**	**100**

Education

As shown in Table 5.3 and Figure 5.3, the majority of participants hold the bachelor's degree with 52.9%, followed by Master's degree with 32.3%. Then 8.8% of the participants had diploma followed by doctorate level, which are 5.2%. This show all the respondents are well literate to answer the questionnaire.

Table 5. 3: Participants' Education

Education	**Frequency**	**Percentage (%)**
Diploma	30	8.8
Bachelor's degree	180	52.9
Master's degree	110	32.3
Doctorate degree	18	5.2
Other	2	0.8
Total	**340**	**100**

Work Experience

The work experience high percentage represents clearly that all participants are experienced in the technology business incubators. Figure 5.4 and Table 5.4 show that 45.6% of participants had 3-5 years of work experience, followed by participants had more than 5 years of work experience with 27.9%. Then 22.1% of participants had work experience of 1-3 years, followed by less than one year, which is 4.4%.

Table 5.4: Participants' Work Experience

Work Experience	**Frequency**	**Percentage (%)**
Less than one year	15	4.4
1 – 3 years	75	22.1
3 – 5 years	155	45.6
More than 5 years	95	27.9
Total	**340**	**100**

Incubators

With respect to incubators, as shown in Figure 5.5 and Table 5.5, 44.1% of participants were from BADIR-ICT, 19.1% participants were from the King Saud University Science Park (KSSP), followed by 10.3% from the King Abdul Aziz City for Science and Technology (KACST), 8.8% were from Umm Al Qura University Institution of Innovation and Entrepreneurship and 5.9% from Business Incubators and Technology Center in Royal Commission for Yanbu. This shows participation from all technology incubators in Saudi.

Table 5.5: Participants' Department

Department	Frequency	Percentage (%)
King Abdullah Bin Abdul Aziz Science Park	40	11.8
King Saud University Science Park	65	19.1
King Abdul Aziz City for Science and Technology	35	10.3
BADIR-ICT	150	44.1
Umm Al Qura University Institution of Innovation and Entrepreneurship	30	8.8
Business Incubators and Technology Center in Royal Commission for Yanbu	20	5.9
Total	**340**	**100**

5.3 Verifying Survey Data

This section presents the preliminary statistics of all factors used in this study, includes standard deviations and standard errors of the mean, missing data and assessment of normality, and outlier screening. The descriptive statistics of all the factors are presented in the following sections.

5.3.1 Missing Data Analysis and Assessment of Normality

Having missing cases is very common for data sets (Kline 2005). However, in this study, incomplete responses and missing values are removed prior to the analysis, so there were no missing observations used in the analysis. The normality assessment is also necessary in the data analysis (Hair et al. 2006), which is measured by 'skewness' and 'kurtosis' techniques (Tabachnick & Fidell 2007). Skewness is a measure of symmetry of the distribution while kurtosis is a measure of the peakedness (Hair et al. 2006). The acceptable range of both the kurtosis and skewness is in between +2.00 and

-2.00 values for a normal distribution. In this study, all values are within the recommended value range for the entire items (see Table 5.6 to Table 5.11).

5.3.2 Outliers Screening

An outlier screening refers to the observation values in a given sample that are significantly different from other observations (Hair et al. 2006). Data outliers can possibly bias the mean and increase the standard deviation (Field 2009), such as cases values that have more than three standard deviations beyond the mean are considered as outliers (Kline 2005). Thus, to detect extreme deviations in this study, all 340 cases were converted into standardized z-scores. Any cases with an absolute value of z-scores ($|z|$) greater than 3.29 are considered outliers (Tabachnick & Fidell 2007). Table 5.6 to Table 5.11 shows no factor has absolute z-scores greater than 3.29, which indicates an absence of outliers. Therefore, all 340 cases were taken for data analyses.

5.3.3 Standard Deviations and the Mean

Standard deviation (SD) is a measure of how well the mean denotes the observed data (Field 2009). A small SD shows less dispersed data and thus it effectively represents the data, while large SD indicates that mean is not a suitable representation of the data. In the current study, all SD for all factors effectively represents the data. In addition, the mean value can be utilized as a representative score for each factor in the data set. Table 5.6 to Table 5.11 shows all values.

5.4 Preliminary Data Analysis

Table 5.5 to Table 5.11 show the descriptive analysis of items of all the factors in the current study (knowledge-sharing organizational factors, knowledge sharing individual factors, the knowledge-sharing process, individual creativity, diffusion of innovation

and technology incubator performance).

5.4.1 Knowledge Sharing Organizational Factors

This measure of knowledge sharing organizational factors includes: management support, IT support, and rewards. All these factors are formed of 13 different items. Overall, 40.4% of the respondents agreed and 35.4% of the sample strongly agreed. Only 1.9% strongly disagreed for the importance of knowledge-sharing organizational factors for influencing the knowledge-sharing process.

Table 5. 6: Knowledge Sharing Organizational Factors Descriptive Statistics

Knowledge sharing organizational factors	**Cases with z > 3.29**	**Skewness**	**Kurtosis**	**M**	**St Dev**	**SD % 1**	**D % 2**	**N % 3**	**A % 4**	**SA % 5**
Management Support (MS)										
MS1: The top management provides with necessary resources and environment for motivating employees.	0.0%	0.41	-0.08	4.21	0.84	1	2.5	10	42.5	44
MS2: Motivation by top management has a bigger role in knowledge sharing within the technology business incubator.	0.0%	0.42	0.09	4.16	0.81	1	3.5	10	45	40.5
MS3: The top management of technology business incubator keeps a two-way communication system always open for encouraging weak performers.	0.0%	0.43	-0.51	4.13	0.80	2	3	11.5	39.5	44
IT Support (ITS)										
ITS1: The technology business incubator facilitates me with appropriate technical tools required for knowledge sharing.	0.0%	0.42	0.11	4.20	0.94	1	6	21.7	33	40.3
ITS2: My co-workers utilize electronic data management system for accessing and storing the recent information.	0.0%	0.45	-1.38	3.19	0.81	1.5	4.4	18.9	39.9	35.3
ITS3: The advanced technological tools that are available in technology business incubator promote knowledge sharing	0.0%	0.33	-0.58	3.45	1.21	5.6	6.9	26.3	38.5	22.7

Reward (RWD)										
Rwd1: The top management financially rewards the employees for knowledge sharing initiatives in technology business incubator.	0.0%	-0.19	-0.07	3.63	1.19	3.7	6.6	19.9	40.1	29.8
Rwd2: Rewards for knowledge sharing contribute to motivating the employees.	0.0%	0.33	-0.52	3.29	0.90	1.0	2.2	13.4	39.3	44.3
Rwd3: The top management adopts non-monetary measures for rewarding the employees that share their experiences and knowledge.	0.0%	0.31	-0.17	4.12	0.85	1.2	1.7	16.6	37.2	42.8
Average						**1.9**	**4.28**	**18.1**	**40.4**	**35.4**

5.4.2 Knowledge Sharing Individual Factors

This measure of knowledge sharing individual factors includes: self-efficacy, Interpersonal trust, and enjoyment in sharing. All these factors are formed of 10 different items. Table 5.7 shows that 39.9% of the respondents stated that they agree with the concept, while 38.0% strongly agree.

Table 5. 7: Knowledge Sharing Individual Descriptive Statistics

Knowledge sharing individual factors	**Cases with z > 3.29**	**Skewness**	**Kurtosis**	**M**	**StDev**	**SD % 1**	**D % 2**	**N % 3**	**A % 4**	**SA % 5**
Self-Efficacy (OIC)										
OIC1: My individual performance represents the level of self-efficacy.	0.0%	1.19	0.28	4.25	0.83	1.5	2.5	18	34.5	43.5
OIC2: My focus on the development of skills has a direct impact on my level of self-efficacy.	0.0%	0.87	0.21	4.17	0.75	1.8	6.1	10.7	41.4	40
OIC3: Self-efficacy plays an important role in efficient sharing of knowledge.	0.0%	0.77	0.31	4.11	0.76	1.8	4.4	12.8	52.2	28.8
Interpersonal Trust (IPT)										
IPT1: I don't hesitate to share my feelings and points of view with my colleagues at the workplace	0.0%	-0.62	0.19	4.31	0.84	1.3	5.8	20.6	34	38.3
IPT2: I believe that staff should not share personal information at the workplace.	0.0%	-0.74	0.43	4.32	0.71	1.5	4.3	18.9	39.4	35.9

IPT3: In our incubator, a considerable level of trust exists among colleagues.	0.0%	-0.82	0.04	4.13	1.31	3.4	3.6	18	34	41
Enjoyment in Sharing (ENS)										
ENS1: My colleagues love sharing their knowledge with other workers.	0.0%	-0.11	-0.29	3.33	0.35	2	6.6	19.7	40.4	31.3
ENS2: I enjoy helping colleagues by sharing my knowledge	0.0%	0.21	-0.52	3.43	0.33	1.3	1.2	13.7	39.8	44
ENS3: Sharing my knowledge with colleagues is pleasurable	0.0%	0.14	-0.14	3.31	0.31	1.6	2.7	15.6	42.2	37.9
Average						**1.8**	**4.3**	**15.8**	**39.9**	**38.0**

5.4.3 Knowledge-Sharing Process

This factor tested through 6 different items. Table 5.8 shows that 35% of the respondents had agreed with this concept.

Table 5. 8: Knowledge-sharing Process Descriptive Statistics

Knowledge-sharing process (KSP)	**Cases with z > 3.29**	**Skewness**	**Kurtosis**	**M**	**StDev**	**SD %**	**D %**	**N %**	**A %**	**SA %**
						1	**2**	**3**	**4**	**5**
(Donation and Collection)										
DON1: I often share with my colleagues my knowledge, working skills and information that I have learned	0.0%	1.07	0.11	4.1	0.83	3.4	17.7	33.8	43.9	3.4
DON2: My colleagues often share with me knowledge, working skills and information that they have learned	0.0%	0.67	0.15	4.0	0.85	6.8	12.7	39.4	39.9	6.8
DON3: Knowledge sharing among colleagues is considered normal in my company	0.0%	0.77	0.20	4.0	0.76	4.8	12.4	52.8	28.2	4.8
COL1: I share my knowledge, working skills and any information I have with colleagues when they ask for it	0.0%	-0.53	0.17	4.3	0.74	5.3	19.5	33.6	40.5	5.3
COL2: My colleagues usually share with me knowledge, working skills and information they know when I ask them	0.0%	-0.60	0.39	4.3	0.81	4.5	18.9	39.3	35.4	4.5
COL3: Knowledge sharing is considered as a normal practice	0.0%	-0.78	0.05	4.1	1.01	6.9	26.3	38.7	22.5	6.9
Average						5.2	17.9	39.6	35.0	5.2

5.4.4 Diffusion of Innovation

DOI consisted of nine items, as shown in Table 5.9. The responses suggest that 40.7% respondents had agreed with these factors.

Table 5. 9: DOI Descriptive Statistics

Diffusion of Innovation (DOI)	Cases with z > 3.29	Skewness	Kurtosis	M	StDev	SD %	D %	N %	A %	SA %
						1	2	3	4	5
Complexity (ComX)										
ComX1: Complexity feature of innovation hinders the diffusion of technology in the technology business incubator.	0.0%	0.73	0.49	3.51	0.91	1.2	7.3	48.7	25.3	17.5
ComX2: The sharing of ideas and mutual discussions can reduce the complexity of innovation diffusion in the technology business incubator	0.0%	0.85	0.42	3.76	0.90	1.9	9.9	14.8	57	16.3
ComX3: In the technology business incubator, innovation complexities are resolved by educating employees about the foundation of developed innovation.	0.0%	0.76	0.33	4.04	0.93	2.3	6.8	9.7	50.1	31.1
Compatibility (ComB)										
ComB1: Compatibility of innovation is aligned with the current values and practices of the technology business incubator are necessary.	0.0%	0.83	0.76	3.72	1.04	2.6	7.1	36.4	23.9	30
ComB2: Our innovation is compatible with our social values.	0.0%	0.73	0.62	3.57	0.92	2.1	6.2	30.8	35.2	25.7
ComB3: Innovations do not contradict incubator's policy or situation	0.0%	0.69	0.53	3.74	0.80	1.3	4	28.3	52.3	14.1
Relative Advantage (RA)										
RA1: My co-workers perceive innovation as advantageous.	0.0%	-0.19	-0.39	3.8	-0.31	3.3	6.6	19.7	40.8	29.6
RA2: Relative advantage of innovation plays a crucial role in persuading people for innovation adoption.	0.0%	0.21	-0.42	3.7	-0.35	2	1.2	13.3	39.3	44.2
RA3: Our innovation largely determines the specific type of	0.0%	0.31	-0.24	3.9	-0.61	1.7	2.7	15.6	42.8	37.2

relative advantage (such as economic, social.										
Average						**2.04**	**5.76**	**24.1**	**40.7**	**27.3**

5.4.5 Individual Creativity Factors

This measure of creativity includes intrinsic motivation, expertise, and creative thinking skills. As shown in Table 5.10, only 2% strongly disagreed for the importance of creativity while 40% agreed, and 36% strongly agreed individual creativity influencing incubator performance.

Table 5.10: Individual Creativity Descriptive Statistics

Individual Creativity Factors	**Cases with z > 3.29**	**Skewness**	**Kurtosis**	**M**	**StDev**	**SD %**	**D %**	**N %**	**A %**	**SA %**
						1	**2**	**3**	**4**	**5**
Intrinsic Motivation (IM)										
IM1: We have a useful of resources to work effectively.	0.0%	1.06	0.18	4.15	0.93	1	3.7	17.9	33.7	43.7
IM2: I am affected by the work environment to be engaged in the creative process.	0.0%	0.74	0.21	4.07	0.95	1.1	6.8	12.4	39.7	39.9
IM3: I enjoy challenging in my work.	0.0%	0.83	0.40	4.01	0.86	1.8	4.4	12.2	52.8	28.8
Expertise (Exp)										
Exp1: I know what our organization wants to achieve	0.0%	-0.61	0.36	4.3	0.94	1.1	5.3	19.6	33.5	40.5
Exp2: I have the acquired expertise in particular field.	0.0%	-0.70	0.39	4.3	0.81	1.5	4.4	18.9	39.3	35.9
Exp3: I can solve complex problems	0.0%	-0.88	0.09	4.1	1.21	5.9	6.6	26.5	38.3	22.7
Creative Thinking Skills (CTS)										
CTS1: I am good at generating novel ideas	0.0%	-0.19	-0.33	4.10	-0.31	1.3	1.3	5.6	19.7	40.3
CTS2: I have the acquired training for idea generation	0.0%	0.24	-0.41	4.12	-0.35	1.5	1.5	1.2	13.3	39.3
CTS3: Brainstorming sessions help me to connect ideas generation into solution.	0.0%	0.33	-0.23	4.01	-0.61	1.9	1.9	2.7	15.6	42.2
Average						**2**	**5**	**17**	**40**	**36**

5.4.6 Incubator Performance Factors

This measure of incubator performance is formed of 7 different items. As shown in Table 5.11, overall, 36.8% of the sample rated the incubator as highly performer. Only 2% rated as low performer.

Table 5. 11: Incubator Performance Descriptive Statistics

Incubator Performance (IP)	**Cases with z > 3.29**	**Skewness**	**Kurtosis**	**M**	**StDev**	Please assess Incubator firm performance compared to other firms facing similar development challenges or that are in the same business on a scale ranging from 'very low performer' (1) to 'very high performer' (5).				
						1	**2**	**3**	**4**	**5**
IP1: Program profile (growth in budget, space, facilities, services, tenants and staff)	0.0%	1.09	0.18	4.15	0.93	1.3	3.4	17.7	33.9	43.7
IP2: Presence of a complementing research park facility.	0.0%	0.77	0.25	4.07	0.95	1.8	6.1	12.5	39.7	39.9
IP3: Level of funding received from key donors including state, industry, and university.	0.0%	0.87	0.30	4.01	0.86	1.8	4.4	12.8	52.2	28.8
IP4: Tenant firms' survivability (ratio of survivors to discontinuances).	0.0%	-0.63	0.16	4.3	0.94	1.1	5.5	21.6	33.5	40.3
IP5: Tenant firms' employment growth (% annual growth during incubation)	0.0%	-0.70	0.49	4.3	0.81	1.5	4.9	18.3	39.9	35.4
IP6: Impact on university's teaching and research	0.0%	1.09	0.18	4.3	0.94	5.9	6.6	26.5	38.3	22.7
IP7: Students/graduates hired by tenants as employees.	0.0%	0.77	0.25	4.3	0.81	1.7	3	17.9	33.7	43.7
Average						**2.03**	**5.09**	**17.5**	**38.8**	**36.8**

5.5 Reliability Assessment

According to Straub, Boudreau & Gefen (2004), reliability measure is the degree of correlation between items within an individual factor. Reliability is calculated by internal consistency reliability, such as Cronbach's α (Cronbach 1971; Hinkin 1998). Internal consistency means the degree to which responses are consistent across the

items (constructs) within a single measurement scale (Kline 2005). The acceptable value of Cronbach's alpha is 0.7 (Hair et al. 2006; Straub 1989). Table 5.12 to 5.17 show that all Cronbach's α scores were above the acceptable level. In addition, corrected item-total correlation scores were above 0.40 thresholds. "A value of the corrected item-total correlation of less than 0.30 indicates that the variable is measuring something different from the construct as a whole" (Pallant 2007). This indicates that our survey items are reliable and valid. Table 5.12 to Table 5.15 presents the summary of the initial reliability test.

Table 5. 12: Knowledge Sharing Organizational Factors Reliability Assessment

Knowledge Sharing Organizational Factors	Cronbach's Alpha α	Item total correlation	Cronbach's α if Item Deleted
Management Support (MS)			
MS1: The top management provides with necessary resources and environment for motivating employees.	0.814	0.61	0.816
MS2: Motivation by top management has a bigger role in knowledge sharing within the technology business incubator.	0.804	0.50	0.824
MS3: The top management of technology business incubator keeps a two-way communication system always open for encouraging weak performers.	0.812	0.55	0.820
Average	**0.81**	**0.55**	**0.82**
IT Support (ITS)			
ITS1: The technology business incubator facilitates me with appropriate technical tools required for knowledge sharing.	0.847	0.55	0.816
ITS2: My co-workers utilize electronic data management system for accessing and storing the recent information.	0.810	0.60	0.817
ITS3: The advanced technological tools that are available in technology business incubator promote knowledge sharing	0.830	0.602	0.820
Average	**0.83**	**0.58**	**0.82**
Reward (RWD)			

Rwd1: The top management financially rewards the employees for knowledge sharing initiatives in technology business incubator.	0.817	0.57	0.822
Rwd2: Rewards for knowledge sharing contribute to motivating the employees.	0.810	0.50	0.820
Rwd3: The top management adopts non-monetary measures for rewarding the employees that share their experiences and knowledge.	0.870	0.55	0.819
Average	**0.83**	**0.54**	**0.82**
Management Support (MS)			
MS1: The top management provides with necessary resources and environment for motivating employees.	0.817	0.58	0.817
MS2: Motivation by top management has a bigger role in knowledge sharing within the technology business incubator.	0.810	0.61	0.819
MS3: The top management of technology business incubator keeps a two-way communication system always open for encouraging weak performers.	0.822	0.51	0.817
Average	**0.82**	**0.57**	**0.82**

Table 5.13: Knowledge Sharing Individual Factors Reliability Assessment

Knowledge Sharing Individual Factors	**Cronbach's Alpha α**	Item total correlation	Cronbach's α if Item Deleted
Self-Efficacy (OIC)			
OIC1: My individual performance represents the level of self-efficacy.	0.85	0.69	0.86
OIC2: My focus on the development of skills has a direct impact on my level of self-efficacy.	0.86	0.65	0.87
OIC3: Self-efficacy plays an important role in efficient sharing of knowledge.	0.88	0.59	0.83
Average	**0.86**	**0.64**	**0.85**
Interpersonal Trust (IPT)			
IPT1: I don't hesitate to share my feelings and point of views with my colleagues at the workplace	0.82	0.70	0.80
IPT2: I believe that staff should not share personal information at the workplace.	0.85	0.66	0.82
IPT3: In our incubator, a considerable level of trust exists	0.85	0.63	0.84

among colleagues.			
Average	**0.84**	**0.66**	**0.82**
Enjoyment in Sharing (ENS)			
ENS1: My colleagues love sharing their knowledge with other workers.	0.87	0.73	0.80
ENS2: I enjoy helping colleagues by sharing my knowledge	0.83	0.67	0.86
ENS3: Sharing my knowledge with colleagues is pleasurable	0.81	0.69	0.84
Average	**0.84**	**0.70**	**0.83**

Table 5.14: Knowledge-sharing Process

Knowledge-sharing process (Collection and Donation)	**Cronbach's Alpha α**	Item total correlation	Cronbach's α if Item Deleted
DON1: I often share with my colleagues me knowledge, working skills and information that I learn	0.82	0.71	0.803
DON2: My colleagues often share with me knowledge, working skills and information that they learn	0.85	0.67	0.806
DON3: Knowledge sharing among colleagues is considered normal in my company	0.87	0.65	0.807
Average	**0.85**	**0.68**	**0.80**
COL1: I share my knowledge, working skills and information I have with colleagues when they ask for it	0.89	0.52	0.813
COL2: My colleagues usually share with me knowledge, working skills and information they know when I ask them	0.88	0.64	0.812
COL3: Knowledge sharing is considered as a normal practice	0.81	0.63	0.851
Average	**0.86**	**0.60**	**0.825**

Table 5.15: DOI Reliability Assessment

Diffusion of Innovation (DOI)	**Cronbach's Alpha α**	**Item total correlation**	**Cronbach's α if Item Deleted**
Complexity (ComX)			
ComX1: Complexity feature of innovation hinders the diffusion of technology in the technology business incubator.	0.82	0.77	0.836
ComX2: The sharing of ideas and mutual discussions can reduce the	0.85	0.71	0.843

complexity of innovation diffusion in the technology business incubator			
ComX3: In the technology business incubator, innovation complexities are resolved by educating employees about the foundation of developed innovation.	0.86	0.69	0.847
Average	**0.84**	**0.72**	**0.842**
Compatibility (ComB)			
ComB1: Compatibility of innovation is aligned with the current values and practices of the technology business incubator are necessary.	0.83	0.73	0.835
ComB2: Our innovation is compatible with our social values.	0.81	0.79	0.833
ComB3: Innovations do not contradict incubator's policy or situation	0.82	0.77	0.813
Average	**0.82**	**0.76**	**0.827**
Relative Advantage (RA)			
RA1: My co-workers perceive innovation as advantageous.	0.81	0.73	0.826
RA2: Relative advantage of innovation plays a crucial role in persuading people for innovation adoption.	0.83	0.71	0.860
RA3: Our innovation largely determines the specific type of relative advantage (such as economic, social.	0.83	0.69	0.847
Average	**0.82**	**0.71**	**0.84**

Table 5.16: Individual Creativity Factors Reliability Assessment

Individual Creativity Factors	Cronbach's Alpha α	Item total correlation	Cronbach's α if Item Deleted
Intrinsic Motivation (IM)			
IM1: We have a useful of resources to work effectively.	0.82	0.75	0.714
IM2: I am affected by the work environment to be engaged in the creative process.	0.85	0.63	0.765
IM3: I enjoy challenging in my work.	0.86	0.62	0.745
Average	**0.84**	**0.66**	**0.714**
Expertise (Exp)			
Exp1: I know what our organization wants to achieve	0.83	0.67	0.805
Exp2: I have the acquired expertise in particular field.	0.81	0.62	0.813
Exp3: I can solve complex problems	0.82	0.63	0.811

Average	**0.82**	**0.64**	**0.81**
Creative Thinking Skills (CTS)			
CTS1: I am good at generating novel ideas	0.79	0.55	0.81
CTS2: I have the acquired training for idea generation	0.77	0.53	0.79
CTS3: Brainstorming sessions help me to connect ideas generation into solution.	0.80	0.61	0.81
Average	**0.76**	**0.56**	**0.80**

Table 5.17: Incubator Factors Reliability Assessment

Incubator Performance (IP)	**Cronbach's Alpha α**	**Item total correlation**	**Cronbach's α if Item Deleted**
IP1: Program profile (growth in budget, space, facilities, services, tenants and staff)	0.85	0.68	0.86
IP2: Presence of a complementing research park facility.	0.77	0.55	0.79
IP3: Level of funding received from key donors including state, industry, and university.	0.85	0.61	0.81
IP4: Tenant firms' survivability (ratio of survivors to discontinuances).	0.77	0.55	0.81
IP5: Tenant firms' employment growth (% annual growth during incubation)	0.72	0.51	0.77
IP6: Impact on university's teaching and research	0.76	0.53	0.79
IP7: Students/graduates hired by tenants as employees.	0.81	0.67	0.78
Average	**0.89**	**0.58**	**0.80**

5.6 Chapter Summary

In conclusion, this chapter presented descriptive data analysis of the survey method. Firstly, the demographics details were presented of the 340 respondents. The data set was the screened and was found to have acceptable normal distribution. A subsequent assessment of the standard deviation and the mean indicated that the study sample sufficiently represented the population. The reliability analyses of the constructs values provided preliminary findings and were thus considered suitable as an input for the subsequent measurement scale analysis, which is presented in the following chapter.

CHAPTER 6 Measurement Scale Analysis

As discussed in the research methodology section in Chapter 4, in this study a two-step estimation approach of SEM is used for the data analysis. First to ensure the quality of the research model, the measurement model analysis such as exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) is conducted. In the second step, a structural model (path analysis) is assessed using a partial least squares approach. The importance-performance map analysis (IPMA) for generating additional findings and conclusions for managerial actions is also conducted. The following sections present the data analysis in detail.

6.1 Exploratory Factor Analysis (EFA)

According to Straub (1989), the first step in the measurement scale analysis is to conduct the exploratory factor analysis (EFA). The descriptive analysis including the scale reliability is presented in Chapter 5. After the factor reliability, the EFA is required for testing the underlying hypotheses (Gerbing & Anderson 1988). The EFA analyses were computed using SPSS 24. The Bartlett's Test of Sphericity, and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy are conducted for determining the suitability of the data for factor analysis (Field 2009). The minimum acceptable level of KMO and Bartlett's test is 0.60 (Field 2009; Pallant 2007), with p-value (significance level) 0.05 to indicate sufficient correlations among measurement items. Table 6.1 shows the KMO and Bartlett's measures show that the overall inter-correlations assumptions are met.

Table 6.1: KMO and Bartlett's Test

Construct	KMO*	Bartlett's test of sphericity		
		Approx. Chi-Square	***df***	**Sig.**
Management support + IT support + Rewards	0.73	1542.3	99	0.000
ITrust + Enjoyment in sharing+ Self-efficacy	0.71	1443.2	76	0.000
Knowledge sharing donation + Knowledge sharing collection	0.81	720.41	65	0.000
Intrinsic motivation + Expertise + creative thinking skills	0.62	231.5	15	0.001
Complexity + Compatibility + Relative advantage	0.70	797.7	63	0.000
Tech. business incubator	0.67	578.9	60	0.000
* Kaiser-Meyer-Olkin Measure of Sampling Adequacy				

After the data factorability, the Principal Component Analysis (PCA) is conducted. According to Hair et al. (2006, the Principal Component Analysis is achieved by eigenvalue criterion, which suggests that factors having an eigenvalue greater than 1 are significant, while factors having eigenvalue less than 1 should be removed.

6.2 Measurement Model Analysis

The measurement model involves applying confirmatory factor analysis and model fit in order to verify that the variables of the items load onto their corresponding latent variables utilizing the collected data (Kline 2011).

6.2.1 Confirmatory Factor Analysis

As discussed in the methodology section in Chapter 4, convergent and discriminant validity along with the reliability coefficients are important parts of the confirmatory factor analysis (CFA).

Formerly validated survey instruments were utillized so as to ensure the measures were adequate and representative. The loadings of all items on their factors are significant ($p < .01$) and greater than 0.7, which confirms indicator reliability. The Cronbach's alphas of the model factors scope from 0.71 to 0.87. The PLS model estimation reveals that all model constructs exhibit satisfactory internal consistency. Composite reliability values range from 0.79 to 0.88 and average variance extracted (AVE) estimates range from 56% to 79%.

Table 6.2 shows constructs reliability and validity. In addition, the discriminant validity of the latent variables was tested in the PLS model using the Fornell and Larcker (1981) criterion, whereby the AVE of each latent variable should be greater than the latent variable's highest squared correlation with any other latent variable.

Table 6.2: Construct Reliability and Validity

	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Compatibility	0.72	0.82	0.60
Complexity	0.73	0.79	0.56
Creative thinking skills	0.71	0.83	0.61
Enjoyment in Sharing	0.73	0.84	0.63
Expertise	0.74	0.84	0.63
IT support	0.81	0.87	0.75
ITrust	0.73	0.84	0.63
Intrinsic Motivation	0.71	0.80	0.57
Knowledge Sharing Collection	0.74	0.84	0.64
Knowledge Sharing Donation	0.77	0.86	0.67
Management Support	0.81	0.87	0.68

Relative Advantage	0.76	0.79	0.56
Rewards	0.78	0.81	0.59
Self-Efficacy	0.74	0.84	0.63
Tech. Incubator Performance	0.87	0.88	0.60

6.2.2 Model Fit

PLS method requires practically no bias when estimating data from a composite model population, regardless of whether the measurement model is reflective or formative (Sarstedt et al. 2016). Concerning Goodness-of-fit (GoF) indices for partial least squares path modeling, Henseler & Sarstedt (2013) show that goodness-of-fit index is not appropriate for model validation. However, SmartPLS also computed the model fit, which is also assessed by examining the model fit of the PLS path models, namely, the Standardized Root Mean Square Residual (SRMR), Exact Model Fit Tests (d_LS: the squared Euclidean distance and d_G (the geodesic distance), and the Normed Fit Index (NFI) (see http://www.smartpls.de/documentation/fit). For the SRMR, the recommended value should be lower than 0.08; Exact Model Fit Tests (d_LS and d_G) recommended p-values to be greater than 5. NFI values between 0 and 1 are recommended. Table 6.3 shows the model fit results.

Table 6.3: Model Fit

	Saturated Model	Estimated Model
SRMR	0.061	0.067
d_ULS	0.565	0.692
d_G1	0.312	0.337
d_G2	0.252	0.27
NFI	0.84	0.831

Table 6.4 indicates that each of the latent variables meets these requirements, thereby supporting discriminant validity. Average variance extracted (AVE) and the CR are

used to assess convergent validity. This is established if the CR value is greater than the AVE and all the AVE are greater than 0.50 (Hair et al. 2006).

Table 6.4: Discriminant Validity of Constructs

	COM	ComX	CTS	EnjS	Exp	ITS	ITrust	IntM	KSC	KSD	MS	RA	Rew	SE	TIP
Compatibility (COM)	**0.77**														
Complexity (ComX)	0.67	**0.75**													
Creative thinking skills (CTS)	0.74	0.70	**0.78**												
Enjoyment in Sharing (EnJS)	0.79	0.71	0.81	**0.79**											
Expertise (Exp)	0.61	0.53	0.73	0.61	**0.79**										
IT support (ITS)	0.76	0.61	0.63	0.68	0.59	**0.86**									
ITrust	0.61	0.53	0.72	0.61	1.00	0.58	**0.80**								
Intrinsic Motivation (IntM)	0.69	0.64	0.64	0.70	0.54	0.77	0.54	**0.76**							
Knowledge Sharing Collection (KSC)	0.63	0.77	0.64	0.71	0.65	0.66	0.65	0.61	**0.80**						
Knowledge Sharing Donation (KSD)	0.63	0.85	0.59	0.69	0.52	0.62	0.52	0.60	0.82	**0.82**					
Management Support (MS)	0.69	0.69	0.67	0.72	0.55	0.64	0.54	0.67	0.67	0.64	**0.83**				
Relative Advantage (RA)	0.71	0.70	0.77	0.74	0.50	0.54	0.50	0.60	0.55	0.62	0.64	**0.75**			
Rewards (Rew)	0.65	0.62	0.57	0.62	0.42	0.67	0.41	0.69	0.66	0.65	0.63	0.60	**0.77**		
Self-Efficacy (SE)	0.68	0.78	0.82	0.72	0.60	0.65	0.60	0.67	0.72	0.66	0.69	0.76	0.65	**0.80**	
Tech. Incubator Performance (TIP)	0.75	0.76	0.73	0.86	0.63	0.71	0.62	0.73	0.79	0.75	0.89	0.69	0.68	0.80	**0.77**
Diagonal elements are the square root of the AVE.															

The following Tables 6.5 and 6.6 show the reliability and validity assessment and confidence intervals of all factors are above the threshold values.

Table 6. 5: Items Loadings

Items <- Factors	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
COL1 <- Knowledge Sharing Collection	0.74	0.74	0.03	21.61	0.00
COL2 <- Knowledge Sharing Collection	0.82	0.82	0.02	42.97	0.00
COL3 <- Knowledge Sharing Collection	0.82	0.82	0.02	43.53	0.00
CTS1 <- Creative thinking skills	0.79	0.79	0.03	26.26	0.00
CTS2 <- Creative thinking skills	0.76	0.76	0.04	19.50	0.00
CTS3 <- Creative thinking skills	0.80	0.80	0.03	31.12	0.00
ComB1 <- Compatibility	0.80	0.80	0.02	32.22	0.00
ComB2 <- Compatibility	0.77	0.77	0.03	26.79	0.00
ComB3 <- Compatibility	0.75	0.74	0.03	22.81	0.00
ComX1 <- Complexity	0.83	0.83	0.02	40.15	0.00
ComX2 <- Complexity	0.80	0.80	0.03	30.55	0.00

ComX3 <- Complexity	0.77	0.77	0.03	26.69	0.00
DON1 <- Knowledge Sharing Donation	0.83	0.83	0.02	38.49	0.00
DON2 <- Knowledge Sharing Donation	0.78	0.78	0.03	22.88	0.00
DON3 <- Knowledge Sharing Donation	0.85	0.85	0.02	52.09	0.00
ENS1 <- Enjoyment in Sharing	0.72	0.72	0.04	17.72	0.00
ENS2 <- Enjoyment in Sharing	0.81	0.81	0.02	36.20	0.00
ENS3 <- Enjoyment in Sharing	0.84	0.84	0.02	48.19	0.00
Exp1 <- Expertise	0.82	0.81	0.02	34.55	0.00
Exp2 <- Expertise	0.71	0.70	0.04	16.60	0.00
Exp3 <- Expertise	0.85	0.85	0.02	46.86	0.00
IM1 <- Intrinsic Motivation	0.77	0.77	0.03	30.48	0.00
IM2 <- Intrinsic Motivation	0.76	0.76	0.03	23.24	0.00
IM3 <- Intrinsic Motivation	0.74	0.74	0.04	19.09	0.00
ITS1 <- IT support	0.89	0.89	0.01	76.65	0.00
ITS2 <- IT support	0.86	0.86	0.02	46.01	0.00
ITS3 <- IT support	0.84	0.84	0.02	39.13	0.00
ITrst1 <- ITrust	0.82	0.82	0.02	36.40	0.00
ITrst2 <- ITrust	0.73	0.73	0.04	19.86	0.00
ITrst3 <- ITrust	0.83	0.83	0.02	39.13	0.00
MS1 <- Management Support	0.84	0.84	0.02	44.31	0.00
MS2 <- Management Support	0.81	0.81	0.03	30.82	0.00
MS3 <- Management Support	0.84	0.84	0.02	38.26	0.00
RA1 <- Relative Advantage	0.73	0.73	0.04	18.84	0.00
RA2 <- Relative Advantage	0.78	0.78	0.03	27.50	0.00
RA3 <- Relative Advantage	0.85	0.85	0.02	45.76	0.00
Rwd1 <- Rewards	0.74	0.75	0.03	22.61	0.00
Rwd2 <- Rewards	0.78	0.78	0.03	27.78	0.00
Rwd3 <- Rewards	0.78	0.78	0.03	27.96	0.00
SE1 <- Self-Efficacy	0.86	0.86	0.01	62.59	0.00
SE2 <- Self-Efficacy	0.73	0.73	0.04	17.29	0.00
SE3 <- Self-Efficacy	0.79	0.79	0.03	27.02	0.00
TIP1 <- Tech. Incubator Performance	0.87	0.86	0.02	49.43	0.00
TIP2 <- Tech. Incubator Performance	0.77	0.77	0.03	27.12	0.00
TIP3 <- Tech. Incubator Performance	0.87	0.87	0.02	57.32	0.00
TIP4 <- Tech. Incubator Performance	0.77	0.77	0.03	28.82	0.00
TIP5 <- Tech. Incubator Performance	0.70	0.70	0.03	21.53	0.00
TIP6 <- Tech. Incubator Performance	0.73	0.73	0.03	24.90	0.00
TIP7 <- Tech. Incubator Performance	0.82	0.82	0.02	41.25	0.00

Table 6.6: Confidence Intervals Bias Corrected

Items <- Factors	Original Sample (O)	Sample Mean (M)	Bias	2.5%	97.5%
COL1 <- Knowledge Sharing Collection	0.74	0.74	0.00	0.66	0.80
COL2 <- Knowledge Sharing Collection	0.82	0.82	0.00	0.78	0.86
COL3 <- Knowledge Sharing Collection	0.82	0.82	0.00	0.78	0.85
CTS1 <- Creative thinking skills	0.79	0.79	0.00	0.72	0.84
CTS2 <- Creative thinking skills	0.76	0.76	0.00	0.67	0.82
CTS3 <- Creative thinking skills	0.80	0.80	0.00	0.73	0.84
ComB1 <- Compatibility	0.80	0.80	0.00	0.74	0.84
ComB2 <- Compatibility	0.77	0.77	0.00	0.71	0.82
ComB3 <- Compatibility	0.75	0.74	0.00	0.68	0.80
ComX1 <- Complexity	0.83	0.83	0.00	0.79	0.87
ComX2 <- Complexity	0.80	0.80	0.00	0.75	0.85
ComX3 <- Complexity	0.77	0.77	0.00	0.71	0.82
DON1 <- Knowledge Sharing Donation	0.83	0.83	0.00	0.78	0.86
DON2 <- Knowledge Sharing Donation	0.78	0.78	0.00	0.70	0.84
DON3 <- Knowledge Sharing Donation	0.85	0.85	0.00	0.81	0.88
ENS1 <- Enjoyment in Sharing	0.72	0.72	0.00	0.62	0.79
ENS2 <- Enjoyment in Sharing	0.81	0.81	0.00	0.76	0.85
ENS3 <- Enjoyment in Sharing	0.84	0.84	0.00	0.80	0.87
Exp1 <- Expertise	0.82	0.81	0.00	0.76	0.85
Exp2 <- Expertise	0.71	0.70	0.00	0.61	0.77
Exp3 <- Expertise	0.85	0.85	0.00	0.81	0.88
IM1 <- Intrinsic Motivation	0.77	0.77	0.00	0.71	0.81
IM2 <- Intrinsic Motivation	0.76	0.76	0.00	0.69	0.82
IM3 <- Intrinsic Motivation	0.74	0.74	0.00	0.64	0.80
ITS1 <- IT support	0.89	0.89	0.00	0.86	0.91
ITS2 <- IT support	0.86	0.86	0.00	0.83	0.89
ITS3 <- IT support	0.84	0.84	0.00	0.79	0.87
ITrst1 <- ITrust	0.82	0.82	0.00	0.76	0.86
ITrst2 <- ITrust	0.73	0.73	0.00	0.65	0.79
ITrst3 <- ITrust	0.83	0.83	0.00	0.78	0.87
MS1 <- Management Support	0.84	0.84	0.00	0.79	0.87
MS2 <- Management Support	0.81	0.81	0.00	0.74	0.84
MS3 <- Management Support	0.84	0.84	0.00	0.78	0.87
RA1 <- Relative Advantage	0.73	0.73	0.00	0.65	0.80
RA2 <- Relative Advantage	0.78	0.78	0.00	0.72	0.82
RA3 <- Relative Advantage	0.85	0.85	0.00	0.81	0.88
Rwd1 <- Rewards	0.74	0.75	0.00	0.66	0.79
Rwd2 <- Rewards	0.78	0.78	0.00	0.71	0.83
Rwd3 <- Rewards	0.78	0.78	0.00	0.71	0.83
SE1 <- Self-Efficacy	0.86	0.86	0.00	0.82	0.88
SE2 <- Self-Efficacy	0.73	0.73	0.00	0.62	0.79
SE3 <- Self-Efficacy	0.79	0.79	0.00	0.72	0.83
TIP1 <- Tech. Incubator Performance	0.87	0.86	0.00	0.82	0.89

TIP2 <- Tech. Incubator Performance	0.77	0.77	0.00	0.71	0.81
TIP3 <- Tech. Incubator Performance	0.87	0.87	0.00	0.83	0.89
TIP4 <- Tech. Incubator Performance	0.77	0.77	0.00	0.71	0.81
TIP5 <- Tech. Incubator Performance	0.70	0.70	0.00	0.63	0.76
TIP6 <- Tech. Incubator Performance	0.73	0.73	0.00	0.66	0.78
TIP7 <- Tech. Incubator Performance	0.82	0.82	0.00	0.78	0.86

6.3 Structural Model Testing

In order to test the proposed hypotheses, the structural model was tested by analyzing the significance of the paths between factors using t-test calculated with the bootstrapping technique at a 5% significance level. We apply a nonparametric bootstrapping procedure (5,000 subsamples) to evaluate the significance of the path coefficients (Henseler, Ringle & Sinkovics 2009a); we provide the path estimates in Figure 6.1. Table 6.6 indicates the path co-efficient mean, standard deviation and t-statistics and p-value for each of the proposed hypotheses. The recommended t-values are $t > 1.96$ at $p < 0.05$, $t > 2.576$ at $p < 0.01$, $t > 3.29$ at $p < 0.001$ for two-tailed tests.

The coefficients of the causal relationships between factors are identified by the path coefficients significance and the (R^2) variance of the dependent construct. The percentages of explained variance (R^2) for the knowledge sharing donation, knowledge sharing collection, and the tech. incubator performance are 0.56, 0.63, and 0.76, respectively. Therefore, the result of the R^2 shows a satisfactory level of explanation.

In addition, in order to address the predictive relevance of the PLS model, we measured the Stone-Geisser criterion Q^2 using the blindfolding method to compute the construct cross-validated redundancy for assessing the predictive relevance (Henseler, Ringle & Sinkovics 2009b). In our analysis, Q^2 values range from the 'technology incubator performance' construct (i.e., 0.31) above the threshold value of zero, thus indicating a strong predictive relevance.

As Table 6.6 indicates, the findings approve that the relationship is not significant for hypotheses H1a, H3b, H4b, H9, H10, and H11. However, all other hypotheses are accepted at $p < 0.05$. Figure 6.1 shows the path testing.

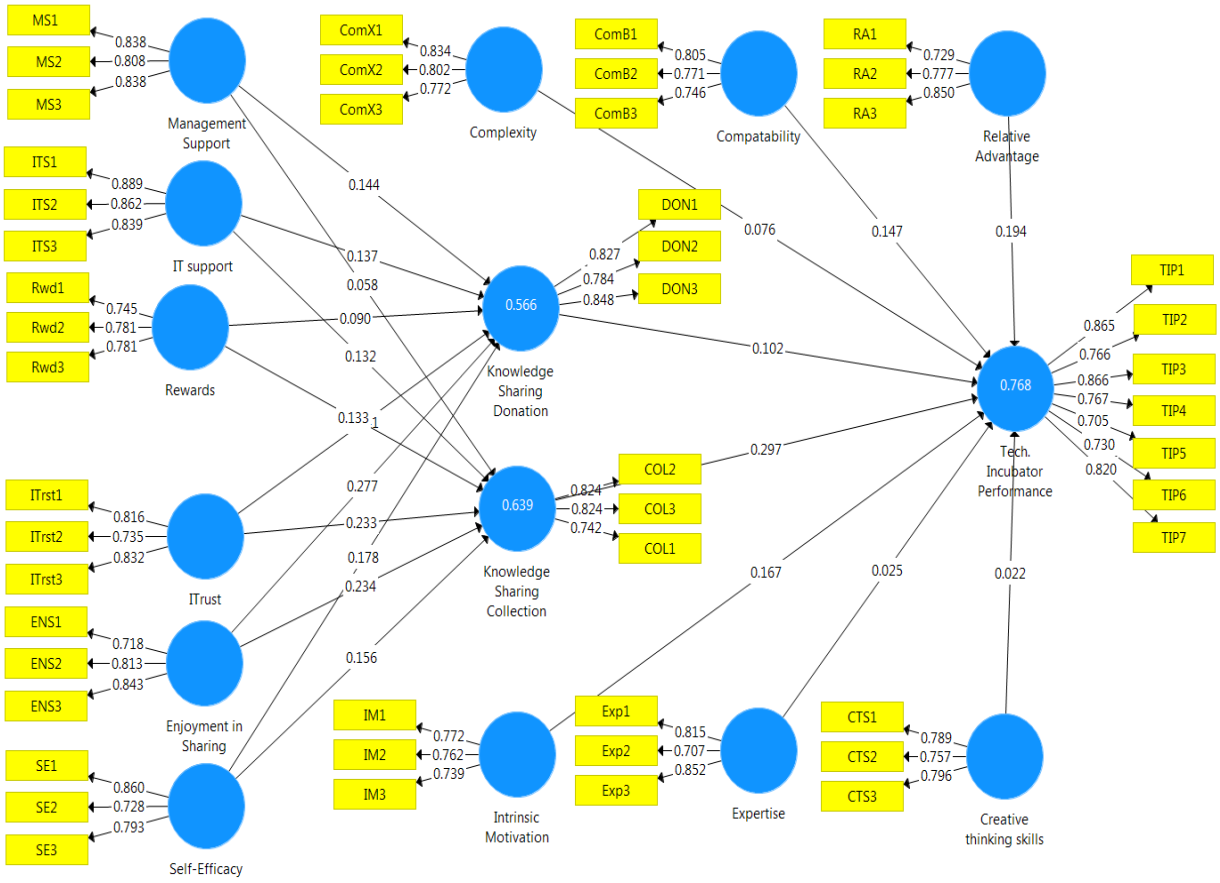

Figure 6.1: Path Testing

Table 6.7: Hypotheses Testing

Hypotheses No	Factor Relation	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics	P Values	Supported?
H1a	Management Support -> Knowledge Sharing Donation	0.14	0.06	2.25	0.02	Yes
H1b	Management Support -> Knowledge Sharing Collection	0.06	0.06	0.97	0.33	No
H2a	IT support -> Knowledge Sharing Donation	0.13	0.06	2.28	0.02	Yes
H2b	IT support -> Knowledge Sharing Collection	0.13	0.06	2.39	0.02	Yes
H3a	Rewards -> Knowledge Sharing Donation	0.10	0.08	1.18	0.24	No
H3b	Rewards -> Knowledge Sharing Collection	0.14	0.06	2.14	0.03	Yes
H4a	ITrust -> Knowledge Sharing Donation	0.04	0.05	0.77	0.44	No
H4b	ITrust -> Knowledge Sharing Collection	0.23	0.05	5.13	0.00	Yes
H5a	Enjoyment in Sharing -> Knowledge Sharing Donation	0.28	0.07	3.98	0.00	Yes
H5b	Enjoyment in Sharing -> Knowledge Sharing Collection	0.23	0.06	3.62	0.00	Yes
H6a	Self-Efficacy -> Knowledge Sharing Donation	0.17	0.08	2.17	0.03	Yes
H6b	Self-Efficacy -> Knowledge Sharing Collection	0.15	0.08	2.01	0.04	Yes
H7a	Knowledge Sharing Donation -> Tech. Incubator Performance	0.10	0.06	1.70	0.03	Yes
H7b	Knowledge Sharing Collection -> Tech. Incubator Performance	0.30	0.06	4.92	0.00	Yes
H8	Intrinsic Motivation -> Tech. Incubator Performance	0.17	0.05	3.63	0.00	Yes
H9	Expertise -> Tech. Incubator Performance	0.02	0.05	0.54	0.59	No
H10	Creative thinking skills -> Tech. Incubator Performance	0.03	0.04	0.62	0.53	No
H11	Complexity -> Tech. Incubator Performance	0.07	0.06	1.19	0.23	Yes
H12	Compatibility -> Tech. Incubator Performance	0.14	0.05	2.84	0.00	Yes
H13	Relative Advantage -> Tech. Incubator Performance	0.20	0.05	3.93	0.00	Yes

According to the path testing indicated in Figure 6.1, the knowledge sharing organizational factor that has a significant effect on “knowledge sharing donation” is “management support”, and on “knowledge sharing collection” it is “rewards”. This indicates that giving incentives to employees helps to encourage knowledge-sharing processes. This could be attributed to the fact that all the survey participants were Muslims. Islamic belief holds that rewards are encouraged by religion, which is

compatible with the Prophet Mohammed's teaching. Additionally, participants' knowledge sharing information is influenced by the degree of top management and IT support. This is consistent with (Gupta & Govindarajan 2000a; Othman, Hawryszkiewycz & Kang 2014; Yew Wong 2005).

In addition to this, the knowledge sharing individual factor that has a significant effect on "knowledge sharing donation" is "enjoyment in sharing," and on "knowledge sharing collection" they are "interpersonal trust" and "enjoyment is sharing." This shows that employees enjoy helping each other and have a good level of faith in each other regarding their capabilities to arrange and implement courses of action required in order to accomplish certain levels of performance. Finally, knowledge-sharing processes (collection) which would enhance technology incubator performance are such as tenant firms' survival and growth, contributions to sponsoring universities' missions and community-related impacts (such as sales, revenues, taxes, experience and graduate employment).

Creativity and innovation are critical to the success of any organization (Mumford, Hester & Robledo 2012). The complexity of an innovation may have a strong influence on its likelihood of spreading because simple innovations are considerably easier to adopt, while more complex innovations may require external pressure (Zhu 2014). Compatibility is also a natural determinant in that, even if a new approach is clearly better, it will be considerably harder to adopt if it is incompatible with existing approaches and therefore requires significant retooling to implement (Sharp & Miller 2016). Thus, firms will consider compatibility seriously in adopting innovations, especially considering that incompatibility has a significant cost in time and equipment, as well as potentially the related expertise. Finally, relative advantage represents how much of an actual benefit the innovation offers. Even if an innovation is simple and

easily compatible, it may not spread easily if firms do not perceive a significant advantage inherent in its adoption compared to existing techniques (Arfken, Madeja & Owens 2015). The results show "intrinsic motivation" and "relative advantage" has the highest effect on "technology business incubator performance." Creativity, along with knowledge and expertise, is one of the central human resources that can help to achieve the technological commercialization competence (Chen & Schaeffer 2009). As such, the recruitment of knowledgeable, skilled and creative personnel can be integral to the overall performance of incubators. Individual Expertise may contribute to creativity in unexpected ways; team members who exhibit considerable dissimilarity in expertise to other members of their team demonstrate statistically significant increases in individual creativity (Huang, Hsieh & He 2014). The recruitment of young graduates who have creative and innovative ideas plays in the transfer of technology to industry (Al-Mubaraki & Wong 2011).

6.4 Importance–Performance Map Analysis

The importance-performance map analysis (IPMA) for producing additional results and conclusions for managerial actions is also conducted (Christian & Sarstedt 2016). The IPMA is explained in detail by (Christian & Sarstedt 2016; Hock, Ringle & Sarstedt 2010). Performing an IPMA requires determining a targeting construct, such as knowledge sharing collection, knowledge sharing donation, and technology incubator performance in our PLS path model. The performance of each construct is measured on a scale from 0 to 100; the closer the value to 100, the higher the performance of the variable.

Over-all effects (importance) larger than 0.10 are significant at the $p \leq 0.10$ level. Table 6.8 and 6.9 and Figure 6.2 to 6.4 shows the IPMA result of the three target constructs

(knowledge sharing collection, knowledge sharing donation, and technology incubator performance).

Table 6.8: IPMA Results of the Knowledge-sharing Process

Latent Variables	**Criterion:** Knowledge Sharing Collection	**Criterion:** Knowledge Sharing Donation	Performances
	Importance	Importance	
Enjoyment in Sharing	0.31	0.17	66.25
IT support	0.11	0.02	59.92
ITrust	0.15	0.01	46.46
Management Support	-0.08	0.11	65.65
Rewards	0.27	0.05	67.89
Self-Efficacy	0.19	0.49	61.73

Table 6.7 shows that the IPMA findings of the "knowledge sharing collection" and "knowledge sharing donation" target constructs, as illustrated in Figure 6.2 the highest importance towards "knowledge sharing collection" is "enjoyment in sharing" factor followed by "rewards." This means that the target construct "knowledge sharing collection" would increase by 0.31 total effects of enjoyment in sharing" and 0.27 total effects of "rewards." In a similar way, as shown in Figure 6.3, the most important factors for the "knowledge sharing donation" target construct are "self-efficacy" followed by "enjoyment in sharing."

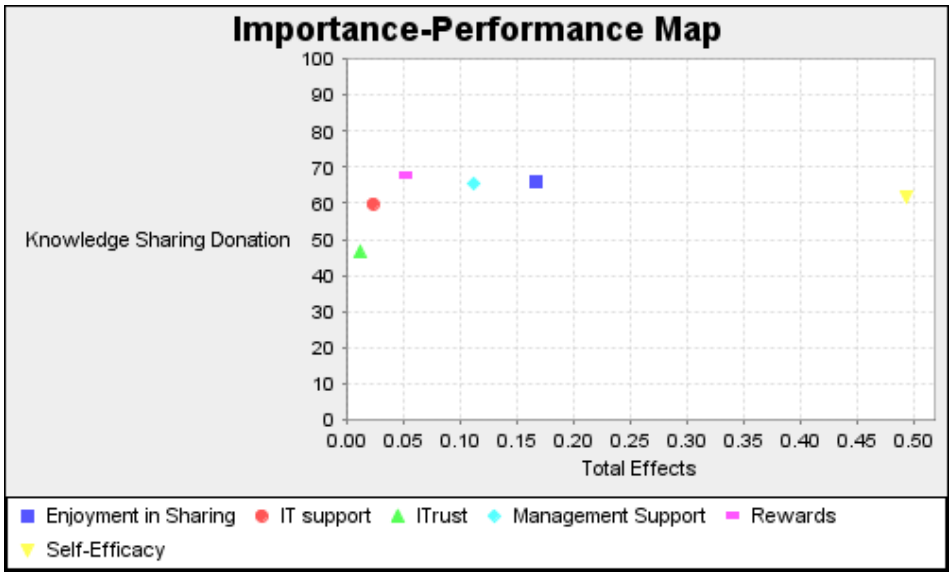

Figure 6.2: IPMA results of the knowledge-sharing process

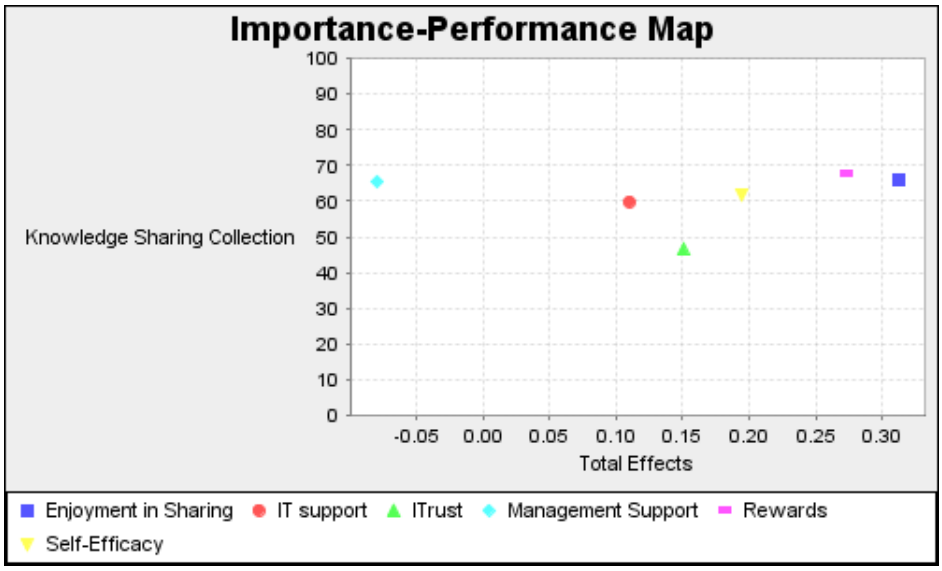

Figure 6.3: IPMA Knowledge Sharing Collection

Regarding the "technology incubator performance," as presented in Table 6.8 and Figure 6.4 the highest performance construct is "relative advantage" followed by "knowledge sharing collection." This means the increase in "relative advantage" performance would increase the performance of the target construct "technology incubator performance" by the size of the total effect. The shows the "technology

incubator performance" would increase by a value of 0.28 of "relative advantage" and 0.23 value of "knowledge sharing collection."

Table 6.9: IPMA Results of Tech. Business Incubator Performance

Criterion: *Tech. Business Incubator Performance*	**Importance**	**Performance values**
Expertise	0.08	46.99
Creative thinking skills	0.05	67.53
Intrinsic Motivation	0.13	63.21
Knowledge Sharing Collection	0.23	57.64
Knowledge Sharing Donation	0.06	65.44
Relative Advantage	0.28	66.32
Compatibility	0.14	68.47
Complexity	-0.02	65.11
Tech. Incubator Performance	0.07	69.09

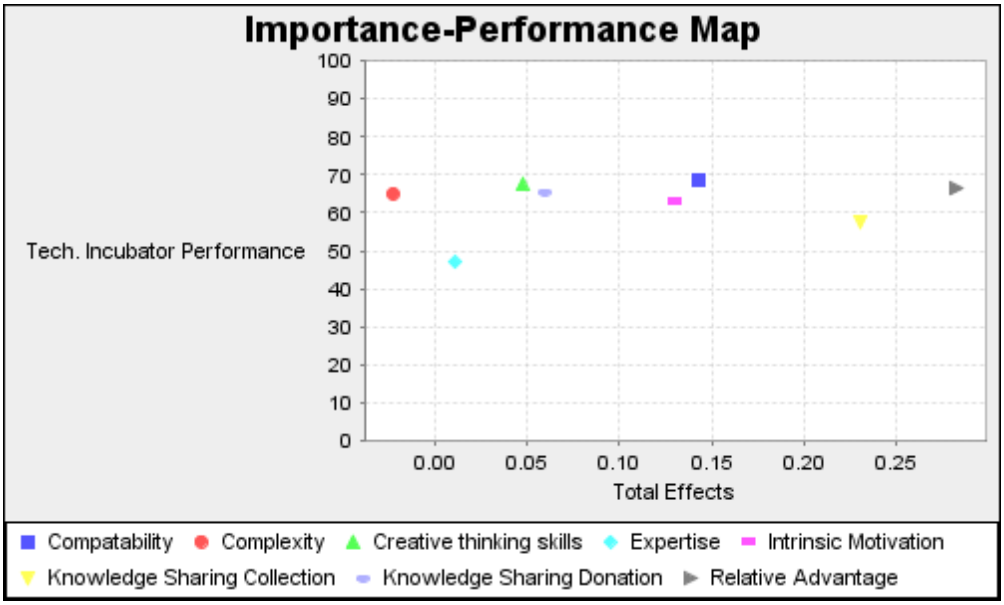

Figure 6.4: IPMA Tech. Business Incubator Performance

Table 6.10: Summary of Hypotheses Results

Hypothesis No	Factor's Group	Hypothesis	Outcome
H1a	**Knowledge Sharing Organizational Factors**	Management Support -> Knowledge Sharing Donation	**Supported**
H1b		Management Support -> Knowledge Sharing Collection	**Not Supported**
H2a		IT support -> Knowledge Sharing Donation	**Supported**
H2b		IT support -> Knowledge Sharing Collection	**Supported**
H3a		Rewards -> Knowledge Sharing Donation	**Not Supported**
H3b		Rewards -> Knowledge Sharing Collection	**Supported**
H4a	**Knowledge Sharing Individual Factors**	ITrust -> Knowledge Sharing Donation	**Not Supported**
H4b		ITrust -> Knowledge Sharing Collection	**Supported**
H5a		Enjoyment in Sharing -> Knowledge Sharing Donation	**Supported**
H5b		Enjoyment in Sharing -> Knowledge Sharing Collection	**Supported**
H6a		Self-Efficacy -> Knowledge Sharing Donation	**Supported**
H6b		Self-Efficacy -> Knowledge Sharing Collection	**Supported**
H7a	**Knowledge-Sharing-Process (Donation& Collection)**	Knowledge Sharing Donation -> Tech. Incubator Performance	**Supported**
H7b		Knowledge Sharing Collection -> Tech. Incubator Performance	**Supported**
H8	**Individual Creativity**	Intrinsic Motivation -> Tech. Incubator Performance	**Supported**
H9		Expertise -> Tech. Incubator Performance	**Not Supported**
H10		Creative thinking skills -> Tech. Incubator Performance	**Not Supported**
H11	**Diffusion of Innovation**	Complexity -> Tech. Incubator Performance	**Supported**
H12		Compatibility -> Tech. Incubator Performance	**Supported**
H13		Relative Advantage -> Tech. Incubator Performance	**Supported**

6.5 Chapter Summary

This chapter presented the Partial Least Squares PLS-SEM results using SmartPLS 3.0. Measurement model structural model (path analysis) is conducted and all the assumptions are met. The data analysis generated mixed results for the hypotheses. The results confirm the relationship is not significant for hypotheses H1a, H3b, H4b, H9, H10, and H11. Importance-performance map analysis (IPMA) is also conducted for generating additional findings and conclusions for managerial actions. In the following, Chapter 7 presents the qualitative results of the study.

CHAPTER 7: QUALITATIVE DATA ANALYSIS

This chapter presents the qualitative data analysis for a case study approach for validating the proposed model and confirming the findings. This case study consists of two Saudi technology business incubators that are called here technology business incubator A and technology business incubator B. In this chapter, the aim of the qualitative data analysis is outlined. Also, the chapter provides overview background about the case study (two technology business incubators) and then the outcomes of the study are presented. After that, the outcomes of the qualitative data analysis are compered to quantitative data analysis in order to achieve the purpose of this chapter, which is validating the hypotheses.

As clarified in Chapter 4, the purpose of this chapter (qualitative data analysis) is validating quantitative findings in order to support confirming the actual phenomena. This purpose is achieved by using an explanatory case study research approach. To apply this, semi structure interviews were directed in two technology business incubators. The sample study of the qualitative part consists of key positions including incubators' mangers, supervisors, business developers from the selected incubators. The sample of this study had been selected based on matching with the quantitative part. Five participants were interviewed for each case study. Prior conducting the interviews, the researcher provides a clear clarification for the purpose of the research and explanation of any technical terms used. Then, the interview was started with participants asking them about their perspectives, beliefs and experiences regarding influencing factors used in this research.

7.1 Technology Business Incubators: A Background

BADIR, meaning "initiate," is a technology incubator program in Saudi Arabia. The program was launched in 2007 through the King Abdul Aziz City for Science and Technology. The main branch of this incubator program is located in the Saudi city of Riyadh, with other two separate physical locations in Jeddah and Damam. As an incubator, the program provides services to start-up Saudi Arabian firms, specifically those with a technological aspect.

The BADIR-ICT incubation program is an incubation program specifically focused on technological innovation (Khorsheed, Al-Fawzan & Al-Hargan 2014). Its establishment, therefore, was meant in part to represent the transition between a traditional economy and a knowledge-based economy for Saudi Arabia. One of the chief aspects of this endeavor is, therefore, the promotion of non-oil-based industry (Khorsheed, Al-Fawzan & Al-Hargan 2014). This is because the Saudi Arabian economy has traditionally relied very heavily on oil-based industry given its vast natural reserves of oil (Al–Saleh & Vidican 2013). However, oil is a nonrenewable resource, and therefore, although oil-based industry has brought the country great wealth, the future of Saudi Arabian cannot be bound to an industry that will eventually run dry in a very literal sense.

Nonetheless, the journey towards sustainability is neither quick nor easy, and so Saudi Arabia has created programs such as BADIR-ICT to aid in that transition (Al–Saleh & Vidican 2013). Since its establishment in 2007, the BADIR-ICT incubator has provided structured support to many technological entrepreneurs in Saudi Arabia (Khorsheed, Al-Fawzan & Al-Hargan 2014). The program is expected to continue to provide support to Saudi technological startups.

Table 7.1: Information about Interviewees at Technology Business Incubator A

	Code	Positions	Years of experience	Educational level	Functional background
1	IM A	Incubator Manager	6	Doctoral degree	Business Administration
2	A-1	Business Developer	15	Bachelor's degree	Management
3	A-2	Innovation and Creativity Department Manager	9	Master's degree	Entrepreneurship
4	A-3	Incubatee Supervisor	6	Master's degree	Information Systems
5	A-4	Incubatee Supervisor	7	Bachelor's degree	Industrial Engineering

IM A specified the following about technology business incubators in Saudi Arabia

> *Saudi Arabia has been successfully investing in the economic side in many aspects. Technology incubators initiative is one of these investments. The main purpose of the initiative of incubators is supporting the economic growth in Saudi Arabia by serving as a knowledge-based economy and consequently promoting the 2030 vision. This initiative aims to support technology projects in our country (Saudi Arabia) by providing them services like consultancy, space, business development and supervision. Also, it is worth mention that we do have programs to support entrepreneurship aiming to transfer creative ideas into innovative real projects. Intellectual capital is the power of economic growth, so we need to support it and make more calibration to enhance this source of power.*

7.2 Technology Business Incubator B Background

King Abdullah incubator for science and technology, which located in King Abdullah university for science and technology KAUST, represents another attempt at technology incubation. Originally, it has been conceived King Abdullah incubator for science and technology and its Science Park (KASP) is one of the leading science incubation in Saudi Arabia. Science parks are essentially incubators, given that they were developed to bridge the gap between science and industry (Mansour & Kanso 2017). The specific form of technology business incubators has seen some interest in the Arabic world in recent years, and KAUST incubator represents one such venture.

Technology business incubators are seen by some scholars as forming the backbone of a country's economic development within the modern, globalizing economy (Binsawad, Hawryszkiewycz & Kang 2016). This importance given to technology startups and the technology business incubators that support them was the driving force behind incubators such as KAUST incubator in Saudi Arabia. To quote the developmental strategy for KAUST incubator, the purpose of the incubation program is "To make a significant contribution to the wealth & welfare of the Kingdom of Saudi Arabia through the development of knowledge-based companies that will also strengthen the achievement of the mission of KFUPM to be a leading institution in the creation and dissemination of knowledge in its chosen fields of study" ("Prince Abdullah Bin Abdulaziz Science Park" 2003, p. 1). Thus, like most incubators, the KAUST incubator represents the extension of a university program into a successful incubator for small, start-up technology firms in Saudi Arabia.

Table 7.2: Information about Interviewees at Technology Business Incubator B

	Code	Positions	Years of experience	Educational level	Functional background
1	IM B	Incubator Manager	5	Master's degree	Computer Science
2	B-1	Business Developer	5	Bachelor's degree	Management
3	B-2	Incubatee Supervisor	8	Bachelor's degree	Entrepreneurship
4	B-3	Incubatee Supervisor	7	Master's degree	Information Systems
5	B-4	Business Developer	9	Master's degree	MBA

7.3 Findings

The emerged outcomes from the interviews are discussed as following

7.3.1 Knowledge Sharing Organizational Factors

It was clearly mentioned by eight participants out of ten that the knowledge-sharing process organizational factors (such as information technology support and motivational rewards) have a positive influence on their knowledge-sharing process and senior management support positively influence donating knowledge only in technology business incubators. Conversely, the rest of participants (two) mentioned that one of the knowledge-sharing process organizational factors which is motivational reward is not essential towards influencing the knowledge-sharing process. The following section contains some the interview outcomes from respondents.

Regarding senior management support, some of the feedback are:

> *In our incubator, supporting donating knowledge is easier than supporting collecting knowledge. We encourage the incubatees in multiple ways to donate or collect knowledge because that would definitely help them to make more progress. Some incubatees are hesitant or shy to ask for what they need or they think they are not efficient, if we encourage them to ask other incubatees for help. As you noticed during your collecting data*

from the incubatees, we do have multiple workshops in different areas. Also, supervisors and business developers are always available to advise and help the incubatees. (A-1)

"I guess the administration of any incubators should consider that providing a supportive climate is essential to either donate or collect knowledge among incubatees. Actually, it is kind of rare or maybe hard to find someone who will spend a special time for sharing knowledge; as an example, as you see around you here in our incubator, everyone is busy most of the time with his or her own project. Therefore, sometimes it would be difficult for incubatees to find an incubatee offering help, even with the supportive climate we provide to support donation and collection processes, which are part of the knowledge-sharing process (B-1)

It's better for those who are mainly responsible for an incubator's development to provide intensive workshops in order to motivate these incubatees to donate or collect knowledge from each other. Doing so would definitely help in enhancing the progress of the projects' outcomes. Some incubatees are encouraged to offer help, but some others are not encouraged to receive knowledge. Actually, we cannot force an incubatee to spend a special time for another incubatee looking for assistance. There are business developers and one of their main tasks is providing assistance for any incubatee (A-3)

Senior management support is an important factor, not only in our incubator, but in every organization. Honestly, all organizations should provide efficient resources to enhance donating and collecting knowledge functions or any initiative (A-4)

Regarding information technology support, some of the supporting responses are:

> *Our incubator provides a system that can be used to donate and collect knowledge, not only between incubatees in this incubator, but also with others incubatees in other incubators in Saudi Arabia*. (IM B).

> *Our incubator is part of the Saudi Business Incubator Network (SBIN) whose major mission is supporting and encouraging technology business incubators to combine, donate and collect knowledge. Also, SBIN has a system that supports the idea of the knowledge-sharing process (A-2)*

> However, one of the participant specified that:
> *We do have a system supporting either donating or collecting knowledge, but generally, information technology for technology incubators still needs more improvement.*

Regarding motivational rewards, some of the feedback are:

> *"I guess it depends on how and what you reward me. For instance, what I consider as an effective motivational reward is encouraging or supporting through an acknowledgment certificate as an example. However, monetary rewards are not as important as acknowledgment for this purpose. Honestly, as a part of this incubator, I see that financial reward is not a useful way that makes me and others donate knowledge" (A-2)*

> *I believe that we should care more about other kinds of motivation rather than relying on motivational reward. Actually, motivational rewards have only a temporary effect on donating or collecting knowledge (B-3)*

The previous feedbacks analysis (qualitative results) from technology business incubator A and B show that information technology support positively influences the knowledge-sharing process (donation and collection) while senior management support positively influences donating knowledge only in technology business incubators. Moreover, motivational reward is not essential in influencing the knowledge-sharing process (donation and collection).

Table 7.3: Summaries of Case Technology Business Incubators in Relation to Knowledge Sharing Organizational Factors

Factor	Hypothesis	Typical Sentences
Knowledge Sharing Organizational Factors	**Hypothesis 1 (H1a-b):** *Senior management support has a significant positive impact on the knowledge-sharing process (donation and collection) in Saudi Arabian technology business incubators.*	A-1: We encourage the incubatees in multiple ways to donate or collect knowledge because that would definitely help them to make more progress. Some incubatees are hesitant or shy to ask for what they need or they think they are not efficient, if we encourage them to ask other incubatees for help B-1: I guess the administration of any incubators should consider that providing a supportive climate is essential to share knowledge among incubatees. Sometimes, it would be difficult for incubatees to find an incubatee offering help, even with the supportive climate we provide to support the donation and collection process, which are part of the knowledge sharing process A-3: It's better for those who are mainly responsible for an incubator's development to provide intensive workshops in order to help these
	Hypothesis 2 (H2a-b): *Information technology support has a significant positive impact on the knowledge-sharing process (donation and collection) in Saudi Arabian technology business incubators.*	
	Hypothesis 3 (H3a-b): *Motivational reward has a significant positive impact on the knowledge-sharing process (donation and collection) in Saudi Arabian technology business incubators*	

		incubatees to progress further in their project. Some incubatees are encouraged to offer help, but some others are not encouraged to receive knowledge A-4: Senior management support is an important factor, not only in our incubator, but in every organization IM-B: Our incubator provides a system that can be used to donate or collect knowledge A-2: SBIN has a system that supports the idea of knowledge sharing A-2: Monetary rewards are not important as acknowledgment for this purpose B-3: Motivational rewards have a temporary effect

7.3.2 Knowledge Sharing Individual Factors

Based on the respondents' opinions resulted as a qualitative analysis from technology business incubator A and B, knowledge sharing individual factors, such as enjoyment in sharing and self-efficacy are essential factors towards the knowledge-sharing process (donation and collection) and interpersonal trust has a positive impact on collection knowledge only. Some of the participants' responses are clarified as following:

Regarding interpersonal trust, some of the supporting feedback is shown as following:

> *I think that if there is no trust between incubatees, there is no knowledge-sharing process. Honestly, trust is one of the important issues we have to consider, especially, for those who*

are donating knowledge. (B-4)

I do believe that we have a good environment that has a lot of features, like enhancing interpersonal trust between incubatees. However, we still have trust issues between incubatees. I can say that trust levels need to be improved for donators and it is normal for collectors. The knowledge-sharing process will not be efficient without a high level of trust between those donating or collecting knowledge. (A-1)

One of the major issues we consider in our incubator is trust between people. One of my colleagues has done a survey study about the trust between incubatees and its result shows that there is a trust issue for donators with those who they are going to provide their knowledge with, while there's no issue for those who seek knowledge (A-3)

Regarding enjoyment in sharing knowledge, some of the supporting feedbacks are shown below:

I think it depends on the person and his personality. For me, I would be happy if I exchanged any knowledge helpful for someone else. Also, I can use this as a reason to communicate with others (A-2)

I believe that donating or collecting knowledge should be pleasurable for anyone, because it is kind of helping or communicating with others. Please let me express that in my own way. Sharing knowledge is a good way of delivering a smile to people through providing them what they actually need or asking them what assistance they really need (B-1)

Regarding self-efficacy, some of the supporting feedbacks are shown below:

> *In our incubator, every incubatee has been selected to be part of the incubator and benefit from the incubator's facilities after going through multiple requirements, like a project presentation, interviews and other kinds of tests. You can clearly understand that we know about the incubatees and their personalities. Honestly, our incubatees are very confident about their knowledge, that's why they are here. We consider every single participation in sharing knowledge process, either donating or collecting, to make our people more confident and encouraged. (A-4)*

> *I think that, for the knowledge-sharing process, you have to be assured about what you are going to produce, because that would have a positive impact on offering or receiving knowledge. In my opinion, I guess self-efficacy is an important issue in the process of knowledge sharing (B-2)*

As the previous responses discussed, it has proven that knowledge sharing individual factors, such as self-efficacy and enjoyment in sharing have a positive impact on knowledge sharing (donation and collection) while Interpersonal trust has a positive impact on collection knowledge only.

Table 7.4: Summaries of Case Technology Business Incubators in Relation to Knowledge Sharing Individual Factors

Factor	Hypothesis	Typical Sentences
Knowledge Sharing Individual Factors	**Hypothesis 4 (H4a-b):** *Interpersonal trust has a significant positive impact on the knowledge-sharing process (donation and collection) in Saudi Arabian technology business incubators.*	B-4: Trust is one of the important issues we have to consider, especially for those who are donating knowledge A-1: I can say that trust levels need to be improved for donators and it is normal for collectors

	Hypothesis 5 (H5a-b): *Enjoyment in sharing has a significant positive impact on the knowledge-sharing process (donation and collection) in Saudi Arabian technology business incubators.*	A-3: One of my colleagues has done a survey study about trust between incubatees and its result shows that there is a trust issue for donators with those who they are going to provide their knowledge with, while there's no issue for those who seek knowledge A-2: I would be happy if I shared any helpful knowledge with someone B-1: Sharing knowledge is a good way of delivering a smile to people through providing them what they actually need A-4: Our incubatees are very confident about their knowledge, that's why they are here B-2: You have to be assured about what you are going to produce, because that would have a positive impact on offering or receiving knowledge
	Hypothesis 6 (H6a-b): *Self-efficacy has a significant positive impact on the knowledge-sharing process (donation and collection) in Saudi Arabian technology business incubators.*	

7.3.3 Knowledge-Sharing Process (Donation and Collection)

All participants from the two cases (technology business incubators A and B) agreed the argument expressing that the knowledge-sharing process (donation and collection) has a positive impact towards technology business incubator performance. There are some participants' responses clarified as following:

Regarding the knowledge-sharing process (donating and collecting), some of the feedbacks are:

> *Regarding donating or collecting knowledge, we do support the incubatees to communicate with others and provide a good environment for that in our incubator. Actually, that would make for motivations and challenges among the incubatees for better outcomes. I do believe that there's a relation between incubatee outcomes and exchanging knowledge. It is like the*

more knowledge you exchange, the more knowledge you will create. (A-2)

Technology business incubators are one of the supporting initiatives of a knowledge-based economy. Sometimes, we do not know about lack of knowledge for some incubatees because they do not want to show that to any of the incubator staff. That would reflect on their project progress negatively. So, donating or collecting knowledge is a good option, especially between the incubatees, to solve this kind problem. We need more knowledge exchange to reflect that in our incubatees' progress (B-2)

We usually organize different workshops to put our incubatees in a good match so they can exchange experiences and contribute or receive knowledge to benefit each other. Achieving that will increase the level of outcomes of our incubator by developing the projects of incubatees more and more. (A-1)

We usually organize different workshops to assist incubatees and put them in a good match so they can benefit from each other by sharing knowledge and experiences. Achieving that will increase the level of the outcomes of our incubator for sure. (B-4)

As shown, in the previous supporting statements, most of the participants strongly feel that knowledge sharing (donation and collection) have a positive impact on technology business incubators.

Table 7.5: Summaries of Case Technology Business Incubators in Relation to the Knowledge-sharing Process (Donation and Collection)

Factor	Hypothesis	Typical Sentences
Knowledge-sharing Process (Donation and Collection)	**Hypothesis 7 (H7a-b):** *Incubatees' willingness to share knowledge (donation and collection) has a significant positive impact on Saudi Arabian technology business incubators' performance.*	A-2: I do believe that there's a relation between incubatee outcomes and exchanging knowledge. It is like the more knowledge you exchange, the more knowledge you will create. B-2: Sharing knowledge is a good option, especially between the incubatees to solve this kind problem. We need more knowledge exchange to reflect that in our incubatees' progress. A-1: We usually organize different workshops to put our incubatees in a good match so they can exchange experiences and contribute or receive knowledge to benefit each other. B-4: We usually organize different workshops to assist incubatees and put them in a good match so they can exchange knowledge and benefit each other.

7.3.4 Individual Creativity

All participation results from two case study (technology business incubator A and B) underlines that individual creativity including intrinsic motivation, expertise, and creative thinking skills is a key factor influencing technology business incubator performance.

Regarding intrinsic motivation, some of the supporting feedbacks are shown below:

> *Every incubatee or entrepreneur has a passion about what he is working on. I have seen a lot of the incubatees who keep*

working on their project for many hours because they like what they are doing. Nobody is forcing them to that. I think it's related to an internal desire. When we have these kind of people (self-motivated) in our incubator, the incubator performance definitely will be enhanced by graduating projects faster (IM-B)

I can say that these incubatees got a chance to be here because they have passion about their projects. Intrinsic motivation or self-motivation is an important aspect in any creative task, which makes any work much better (A-1)

An innovative project is the seed of a creative idea and the root of this creative idea is that someone has a belief in it. I believe that if there was no passion, there would be no real progress in the project (B-1)

I believe that if an organization has gifted people, this organization would have a remarkable performance, the same as we do in our incubator. Those gifted incubatees have a great chance to flourish and continue their projects faster than others. Obviously, there's a direct relation between intrinsic motivation and the incubator performance (A-3)

Regarding expertise, statements were clarified as follows:

I guess you can know the answer of this question. If you ask yourself why most companies require years of experience in their recruiting. The main purpose of having this condition (experience) is they want to guarantee a high level of performance (A-2)

We do not require experience in our incubator. However, it would be better if the incubatee has enough experience and knowledge about the project they work on. No doubt that would

boost up the project sustainability and, consequently, the performance of our incubator (B-1)

I strongly believe that there is a significant relation between experience and performance. For example, if you compare a fresh graduate with an expert in performing a specific task, you clearly notice the difference in performance between them (B-4)

Regarding creative thinking skills feedback was as following:

In my opinion, creative ideas are more efficient to be applied. Also, an applied creative idea has a better opportunity to be flourished. Creativity is the key of innovation. So, we care a lot about improving our incubatees' skills in thinking and generating ideas. (A-3)

I believe that being creative means that I do things in a different way that has an interesting and quick process. Thinking outside the box plays a significant role in flourishing any incubatee project in any incubator. (B-3)

I guess there are many factors that can affect the performance of the incubator. Creative thinking skills is one these factors. In our incubator, we try to develop different skills for incubatees, like the creativity level by organizing different workshops, like problem solving and inviting some experts in business technology development. (B-1)

The previous statements of the participants endorsed the expectation of the study which is intrinsic motivation, expertise, and creative thinking skills have positive impact on technology business incubator performance. The participants expressed that there is positive relation between individual creativity and the incubator performance.

Table 7.6: Summaries of Case Technology Business Incubators in Relation to Individual Creativity

Factor	Hypothesis	Typical Sentences
Individual Creativity	**Hypothesis 8 (H8):** *Intrinsic motivation has a significant positive influence on Saudi Arabian technology business incubators' performance.*	IM-B: When we have these kind of people (self-motivated) in our incubator, the incubator performance definitely will be enhanced by graduating the project faster. A-1: Intrinsic motivation or self-motivation is an important aspect in any creative task, which makes any work much better B-1: I believe that if there was no passion, there would be no real progress in the project A-3: Obviously, there's a direct relation between intrinsic motivation and the incubator performance A-2: The main purpose of having this condition (experience) is they want to guarantee a high level of performance B-1: It would be better if the incubatee has enough experience and knowledge about the project they work on. No doubt that would boost up the project sustainability and, consequently, the performance of our incubator B-4: I strongly believe that there is a significant relation between experience and performance. A-3: We care a lot about improving our incubatees' skills in thinking and generating ideas. B-3: Thinking outside the box plays a significant role in flourishing any incubatee project in any incubator. B-1: We try to develop different skills for incubates, like the creativity level, by organizing different workshops such as problem solving and inviting some experts in business technology developments.
	Hypothesis 9 (H9): *Expertise has a significant positive impact on Saudi Arabian technology business incubators' performance.*	
	Hypothesis 10 (H10): *Creative thinking skills have a significant positive influence on Saudi Arabian technology business incubators' performance.*	

7.3.5 Diffusion of Innovation

The majority of participants believed that compatibility and relative advantage are important factors influencing technology business incubators' performance. Also, participants expressed that why complexity has negative impact on the performance of the technology business incubators.

Regarding complexity of innovations, feedback was as following:

> *One of the main issues of complexity in innovations is usually that incubatees don't commit with the timeframe of their projects to show a real progress. Honestly, we face some difficulties to support these kinds of project, so we sometimes need experts for consultancy (B-1)*

> *I do not think that the complexity of the innovative projects will really help it to attract many users and consequently increase the revenues (A-3)*

> *In our incubator, we do not look at the complexity of innovative project as a feature, but we consider how easily this project can reach the targeted people. I believe that the opposite of complexity, which is usability, will make the innovative projects more successful (A-1)*

> *For me, I like complicated projects that have something unique, but I don't recommend it in the business side, especially for the projects that need normal users. Honestly, it is better to say the truth. People these days look for the easiest way to follow, not for the fancy creative way that has some difficulties to understand (IM-A)*

Regarding compatibility of innovations, some of the supporting statements were:

> *Yeah sure. There are some innovative projects that need to be linked with some potential adopters. I do not think that there would be an indication of estimated revenues or business growth for those projects that don't consider the current values or past experience (A-1)*

> *We support different types of technology projects or innovations. Each one of these projects has its own features that can add value. However, projects with a higher level in both compatibility and relative advantage are easier to be adopted, marketed and diffused (B-3)*

Regarding relative advantage, some of the participants supporting statements were as following:

> *As you know, these days most businesses try to find a competitive advantage to increase their revenues. Innovation can be the advantage the company is looking for, but it has to add a real value. We do have the same concept in the incubator, I mean projects have to attract users. That's why we usually support projects that have a high a potential to reach stakeholders easily (IM-A)*

> *I believe it is important to consider relative advantage as a value added in different aspects, like enhancing the efficiency and productivity or reducing the cost (B-4)*

> *In our incubator, we always encourage the incubatees to identify the features of their projects clearly in order to show the social or economic advantages to make any expected users able to know the benefits of using it (B-1)*

The previous statements of the participants can be interpreted into validating the relation between diffusion of innovation components included in this study and technology business incubator performance. The validation of the relation includes that both compatibility and relative advantage positive impact on technology business incubator performance while complexity has a negative on incubator performance.

Table 7.7: Summaries of Case Technology Business Incubators in Relation to Diffusion of Innovation

Factor	Hypothesis	Typical Sentences
Diffusion of Innovation	**Hypothesis 11 (H11):** *Complexity has a negative impact on Saudi Arabian technology business incubators' performance.*	B1: One of the main issues of complexity in innovations is that usually incubatees don't commit with the timeframe of their projects to show a real progress A3: I do not think that the complexity of the innovative projects will really help it to attract many users and consequently increase the revenues A1: We do not look at the complexity of innovative project as a feature, but we consider how easily this project can reach the targeted people IM-A: People these days look for the easiest way to follow. not for the fancy creative way that has some difficulties to understand A1: I do not think that there would be an indication of estimated revenues or business growth for those projects that don't consider the current values or past experience B3: Projects with a higher level in both compatibility and relative advantage are easier to be adopted, marketed and diffused IM-A: These days most businesses try to find a competitive advantage to increase their revenues B4: I believe it is important to consider relative
	Hypothesis 12 (H12): *Compatibility has a significant positive on Saudi Arabian technology business incubators' performance.*	
	Hypothesis 13 (H13): *Relative advantage has a significant positive impact on Saudi Arabian technology business incubators' performance.*	

		advantage as a value added in different aspects B1: We always encourage the incubatees to identify the features of their projects clearly in order to show the social or economic advantages

7.4 Chapter Summary

This chapter provided the qualitative analysis section of the current study. In order to confirm the outcomes of the quantitative analysis section, this chapter presented relevant supporting statements from participants. The qualitative analysis section shows the various factors influencing technology business incubators' performance. The findings of the section (qualitative) are consistent with the other section (quantitative) and support the proposed hypotheses as well.

CHAPTER 8: DISCUSSION AND CONCLUSION

In this chapter, the outcomes of phase 1 (survey approach) and phase 2 (case study technique) are discussed in terms of answering the present study's research questions. The chapter the presents the current study's implications in terms of theory and practice. Finally, the chapter concludes by clarifying the study's limitations and in proposing recommendations for future research.

8.1 Revising the Research Questions and Hypotheses

Table 8.1: Review on the Research Aim and Objectives, Research Questions and Hypotheses

<table>
<tr><td colspan="3">Research Aim and Objectives
The purpose of this study has twofold aims. First, it aims to examine the impact of the knowledge-sharing practices of incubatees on technology business incubator performance in Saudi context. Second, it examines how creativity and innovation acquired from the business incubator is related to technology business performance. The aims of the study will be clearly clarified in the following objectives: -
• To identify the critical elements of the knowledge-sharing process based on previous studies in order to provide theoretical foundation for the frame work
• To investigate the impact of the knowledge-sharing process (donation and collection) on Saudi Arabian technology business incubator performance.
• To investigate the impact of individual level creativity on Saudi Arabian technology business incubator performance.
• To investigate the impact of diffusion of innovation on Saudi Arabian technology business incubator performance.
• To develop a conceptual model for Saudi Arabian technology business incubator.
• To empirically validate the proposed model through applying survey instrument and case studies.</td></tr>
<tr><td>Factors</td><td>Research questions</td><td>Hypotheses</td></tr>
<tr><td>Knowledge Sharing Organizational Factors</td><td>1a. How do the knowledge-sharing process organizational factors (senior management support, IT support and motivational rewards) influence the knowledge-sharing process (donation and collection) in technology business incubator in Saudi context?</td><td>Hypothesis 1 (H1a-b):
Senior management support has a significant positive impact on the knowledge-sharing process (a-donation and b-collection) in Saudi Arabian technology business incubators.
Hypothesis 2 (H2a-b):
Information technology support has a significant positive impact on the knowledge-sharing process (a-donation and</td></tr>
</table>

		b-collection) in Saudi Arabian technology business incubators. **Hypothesis 3 (H3a-b):** *Motivational reward has a significant positive impact on the knowledge-sharing process (a-donation and b-collection) in Saudi Arabian technology business incubators*
Knowledge Sharing Individual Factors	1b. How do the knowledge-sharing process individual factors (interpersonal trust, enjoyment in sharing and self-efficacy) influence the knowledge-sharing process (Donation and Collection) in technology business incubators in the Saudi context?	**Hypothesis 4 (H4a-b):** *Interpersonal trust has a significant positive impact on the knowledge-sharing process (a-donation and b-collection) in Saudi Arabian technology business incubators.* **Hypothesis 5 (H5a-b):** *Enjoyment in Sharing has a significant positive impact on the knowledge-sharing process (a-donation and b-collection) in Saudi Arabian technology business incubators.* **Hypothesis 6 (H6a-b):** *Self- Efficacy has a significant positive impact on the knowledge-sharing process (a-donation and b-collection) in Saudi Arabian technology business incubators.*
Knowledge-sharing Process (Donation and Collection)	2. How does the knowledge-sharing process (donation and collection) influence technology business incubators' performances in the Saudi context?	**Hypothesis 7 (H7a-b):** *Incubatees' willingness to share knowledge (a-Donation and b-Collection) has a significant positive impact on Saudi Arabian technology business incubators' performance.*
Individual Creativity	3.How does individual creativity of incubatees influence technology business incubators' performances in the Saudi context?	**Hypothesis 8 (H8):** *Intrinsic motivation has a significant positive on Saudi Arabian technology business incubators' performance.* **Hypothesis 9 (H9):** *Expertise has a significant positive impact on Saudi Arabian technology business incubators' performance.* **Hypothesis 10 (H10):** *Creative thinking skills have a significant positive on Saudi Arabian technology business incubators' performance.*
	4.How does diffusion of the innovation factors of incubatees influence technology business	**Hypothesis 11 (H11):** *Complexity has a negative impact on Saudi Arabian technology business incubators'*

Diffusion of Innovation	incubators' performance in the Saudi context?	*performance.* **Hypothesis 12 (H12):** *Compatibility has a significant positive on Saudi Arabian technology business incubators' performance.* **Hypothesis 13 (H13):** *Relative advantage has a significant positive impact on Saudi Arabian technology business incubators' performance.*

8.2 Discussion of the Research Findings

Mixed findings are generated from the data analysis results. In order to answer the research questions, 13 hypotheses were developed. These hypotheses were evaluated through two phases (quantitative and qualitative) in order to determine the significance of the factors' relations discussed in this study (Chapter 5,6 and 7). The next section discusses the study findings.

8.2.1 Findings on Knowledge Sharing Organizational Factors

The first research sub question 1a and the related hypotheses that investigated relation between the frequently utilized knowledge sharing organizational factors (management support, IT support and motivational rewards) and the knowledge-sharing process (donation and collection) between incubatees in Saudi Arabian technology business incubator performance.

Hypothesis 1 a & b discusses that senior management support has a significant positive impact on the knowledge-sharing process (donation and collection) in Saudi Arabian technology business incubators. As discussed in Chapter 5, the results show a strong statistical report of the impact of management support on the knowledge donation of incubates, while support was not found on the knowledge collection of incubatees in Saudi Arabian technology business incubators. This means that the information or

insights donated by incubatees are considerably influenced by senior management support. This is compatible with the literature (Gupta & Govindarajan 2000b; Othman, Hawryszkiewycz & Kang 2014; Yew Wong 2005) which underlines that senior management support is important in the knowledge-sharing process and that employees are influenced by the degree of senior management support. The outcomes of the qualitative section (case study analysis) also confirmed the quantitative one (survey results). The findings of the case study analysis presented that the majority of participants agree management support has a significant positive impact on knowledge donation only in Saudi Arabian technology business incubators. This can be interbred into that management support forms the foundation technology business incubators culture which can be enhanced and developed by the senior management who need to establish a supportive clime for knowledge sharing.

Hypothesis 2 a & b proposed that information technology support has a significant positive impact on the knowledge-sharing process (donation and collection) in Saudi Arabian technology business incubators. The findings presented in Chapter 5 show that a strong statistical report of the impact of information technology support on the knowledge-sharing process (donation and collection) of incubatees in Saudi Arabian technology business incubators. This endorses that information technology support is essential in order facilitate the knowledge-sharing process (donation and collection) of incubatees. The outcomes are compatible with the literature (De Vries, Van den Hooff & de Ridder 2006; Hsu 2008; Ismail Al-Alawi, Yousif Al-Marzooqi & Fraidoon Mohammed 2007; Kim & Lee 2004; Yap et al. 2010). The outcomes of the qualitative section (case study analysis) also confirmed the quantitative one (survey results). All participants expressed that the utilization of information technology like the Saudi business incubator network (SBIN) and other tools to support the incubatees'

communications is important for the knowledge-sharing process (donation and collection) in Saudi Arabian technology business incubators.

In contrast with the expectation of this study, significant statistical report was not found for the two parts of Hypothesis 3 a &b, which posted that motivational reward has a significant positive impact on the knowledge-sharing process (donation and collection) in Saudi Arabian technology business incubators. Previous studies resulted that rewards positively influence employees' willing for sharing knowledge (Bartol & Srivastava 2002; Jolaee et al. 2014; Wang & Noe 2010). However, the study findings show that there is only a significant relation between motivational rewards and knowledge collection while there is an insignificant relation between motivational rewards and knowledge donation. These results can be interbred into the fact that all the participants of two approaches (survey and case study) are Muslims. Based on Islamic belief, rewards are motivated by religion, which is compatible with the Prophet Muhammad's (PBUH) teaching, as reported by Ibn Masaud, who said: "Envy is permitted only in two cases: a man whom Allah gives wealth, and he disposes of it rightfully, and a man to whom Allah gives knowledge and he applies and teaches it." Therefore, motivational reward for knowledge donation is not considered as an important influence by participants. On the other hand, the outcomes of the qualitative section (case study analysis) show mixed point of views from the participants. Some of the participants feel that rewards support them to share knowledge, but others do not see rewards as a key factor for knowledge sharing in Saudi Arabian technology business incubators.

8.2.2 Findings on Knowledge Sharing Individual Factors

The second research sub question 1b and the correlated hypotheses that investigated relation between the frequently utilized knowledge sharing individual factors (interpersonal trust, enjoyment in sharing and self-efficacy) and the knowledge-sharing process (donation and collection) between incubatees in Saudi Arabian technology business incubator performance.

Hypothesis 4 a & b argues that interpersonal trust has a significant positive impact on the knowledge-sharing process (donation and collection) in Saudi Arabian technology business incubators. The findings of the survey statistically support the relationship between interpersonal trust knowledge collection only. This shows that a good level of faith in each other's capabilities to arrange and perform courses of action is required to achieve certain levels of performance. This is compatible with the literature (Bijlsma & Koopman 2003; Davenport & Prusak 1998; Fukuyama 1995; Ma, Qi & Wang 2008). The findings of the qualitative section (case study analysis) also confirmed the quantitative one (survey results). The majority of the participants highlighted that interpersonal trust can be considered an important individual impact leading to positive knowledge sharing (collection) in Saudi Arabian technology business incubators.

Moreover, a significant statistically support was resulted by the survey for Hypothesis 5 a & b, which proposed that enjoyment in sharing has a significant positive impact on the knowledge-sharing process (donation and collection) in Saudi Arabian technology business incubators. This shows that incubatees enjoy helping each other and that plays a significant role in donating and collecting knowledge in the incubators. This finding is compatible with the previous studies (Lin 2007; McLure Wasko & Faraj 2000; Wasko & Faraj 2005) which finds that employees may be more favorable oriented towards knowledge sharing– in terms of both donation and collecting knowledge. The outcomes

of the case study analysis also show that all participants agreed on that incubatees are interested to donate or collect knowledge because of enjoyment in helping and communicating with others.

Hypothesis 6 a & b suggests that self- efficacy has a significant positive impact on the knowledge-sharing process (donation and collection) in Saudi Arabian technology business incubators. This hypothesis is confirmed by the quantitative results(survey) presented in Chapter 5. The analysis shows a strong statistical report of the impact of self- efficacy on the knowledge process (donation and collection) of incubatees in the incubator. This means that the more incubatees are confident about their abilities, the more knowledge will be exchanged between them. These findings are compatible with the literature (Bandura 1997; Gist & Mitchell 1992) which underlines that an individual's sense of self-efficacy is affected by their tendency to take actions, such as level of problems, expressed interest, tenacity and the effort required to achieve a task. The outcomes of the qualitative section (case study analysis) also confirmed the quantitative one (survey results). All participants feel that self-efficacy is essential determinant of the knowledge-sharing process (donation and collection) in Saudi Arabian technology business incubators.

8.2.3 Findings on the Knowledge-Sharing Process

Research question 2 and correlated hypotheses that explored the relationship between knowledge sharing process (donation and collection) between incubatees and Saudi Arabian technology business incubator performance.

Hypothesis 7 a & b argues that incubatees' willingness to share knowledge (donation and collection) has a significant positive impact on Saudi Arabian technology business incubators' performance. As discussed in Chapter 5, the results show a strong statistical

report for the relation between the knowledge-sharing process (donation and collection) and the performance of technology business incubator in Saudi Arabia. This means that effective knowledge processes can create the necessary organizational intellectual capital and intangible resources required to improve performance of the incubator. These findings are compatible with the previous studies (Erickson, Rothberg & Carr 2003; Nold 2012; Rahab 2011; Van Den Hooff & De Ridder 2004), which shows that when organizations know how to manage their knowledge assets better, then they will have greater chance for better performance in the market. The outcomes of the qualitative section (case study analysis) also confirmed the quantitative one (survey results). All participants agreed that an effective knowledge-sharing process (donation and collection) has a great chance to lead to enhancing in Saudi Arabian technology business incubators.

8.2.4 Findings on Individual Creativity Factors

Research question 3 and correlated hypotheses that investigated the relationship between individual creativity including expertise, creative thinking skill, and intrinsic task motivation and Saudi Arabian technology business incubator performance.

According to the expectation of the study and previous studies, the three factors of individual creativity expertise, creative thinking skill, and intrinsic task motivation has vital impact on organizational performance (George & Zhou 2002; Grewal, Levy & Kumar 2009; Oldham & Cummings 1996). Creativity, along with knowledge and expertise, is one of the central human resources that can help to achieve the technological commercialization competence (Chen & Schaeffer 2009). As such, the recruitment of knowledgeable, skilled and creative personnel can be integral to the overall performance of incubators. Individual expertise may contribute to creativity in

unexpected ways; team members who exhibit considerable dissimilarity in expertise to other members of their team demonstrate statistically significant increases in individual creativity (Huang, Hsieh & He 2014). However, the findings of the survey analysis show mixed results for the hypotheses related to individual creativity. For example, significant statistical report was found for hypothesis 8, which argues that intrinsic motivation has a significant positive on Saudi Arabian technology business incubators' performance while significant statistical report was not found for the other two hypothesis 9, which argues that expertise motivation has a significant positive on Saudi Arabian technology business incubators' performance, and hypothesis 10 which posted that creative thinking skills has a significant positive on Saudi Arabian technology business incubators' performance. On the other hand, the outcomes of the qualitative section (case study analysis) revealed that the majority of participants expressed that intrinsic motivation, expertise and creative thinking skills are important predictors in the incubator performance would enhance technology incubator performance, such as tenant firms' survival and growth, contributions to sponsoring universities' missions and community-related impacts (such as sales, revenues, taxes, experience and graduate employment).

8.2.5 Findings on Diffusion of Innovation Factors

Research question 4 and the associated hypotheses that investigated the relationship between the most significant constructs of diffusion of innovation (relative advantage, compatibility and complexity) in relationship to Saudi Arabian technology business incubator performance.

Based on the expectation of the study, hypothesis 11 posted that complexity has a negative impact on Saudi Arabian technology business incubators' performance and

hypotheses 12 & 13 argue that compatibility and relative advantage has a significant positive on Saudi Arabian technology business incubators' performance. As discussed in Chapter 5, significant statistical supportive report was found for these hypotheses (11,12 and 13). These findings are aligned with the previous studies (Arfken, Madeja & Owens 2015; Autant-Bernard, Fadairo & Massard 2013; Okeke et al. 2017; Rogers 2003). The complexity of an innovation may have a strong influence on its likelihood of spreading because simple innovations are considerably easier to adopt, while more complex innovations may require external pressure (Zhu 2014). Compatibility is also a natural determinant in that, even if a new approach is clearly better, it will be considerably harder to adopt if it is incompatible with existing approaches and therefore requires significant retooling to implement (Sharp and Miller 2016). Relative advantage represents how much of an actual benefit the innovation offers. Even if an innovation is simple and easily compatible, it may not spread easily if firms do not perceive a significant advantage inherent in its adoption compared to existing techniques (Arfken, Madeja & Owens 2015).

The findings of the qualitative section (case study analysis) also confirmed the quantitative one (survey results) as the majority of the participants reported that complexity, compatibility and relative advantage are crucial in Saudi Arabian technology business incubator performance as the recruitment of young graduates who have creative and innovative ideas plays in the transfer of technology to industry (Al-Mubaraki & Wong 2011).

8.3 Saudi Arabia's Vision 2030 and Incubation Initiative

Like the importance of the incubators in the vision and future goals of any country, they stand extremely important for the Vision 2030 of Saudi Arabia (Salem 2014b). Thus, strong emphasis has been placed on the development of business with technology and

inclination towards valuable innovation. The Kingdom of Saudi Arabia is shifting its traditional business style towards rapid growth and development in technology sector. This has been evident with number of funding programs and initiatives to support, such as technology business incubators (Salem 2014b).

Saudi Arabia's Vision 2030 targets to increase the economic growth by appreciating small and medium-sized organizations and business initiatives. The country recognizes the need for such incentives which result in these small and medium-sized enterprises to contribute significantly to economic growth. This has been estimated to increase from 20% to 35% (Alamoudi 2017). Technology business incubators also perform to rationalize the employment rates. It has been estimated that only 15% increase in contribution from small and medium-sized enterprises will also reduce the unemployment by about 4.6% (Alamoudi 2017).

The performance of the business incubators will definitely impart a strong impact on the future in Saudi Arabia (Al-Mubaraki & Schröl 2011; Al-Mubaraki & Wong 2011). The documentation and targets of Saudi Arabia's Vision 2030 clearly narrates that new business incubators should be established to promote a knowledge-based economy and technological advancements (Alshayea 2013; Salem 2014b). Fine initiatives for the development of specialized training institutions will be taken and investment opportunities will be generated and fixed to appreciate TBIs. The professionals will be given equal opportunities irrespective of gender and race (Islam, Bokhari & Abalala 2018). This is aimed to ease the entrepreneurs in targeting more on research and development then striving to get the basic infrastructure and services to set up the business. Support of small and medium-sized enterprises will be done to improve export of products at easy terms and conditions targeting better economic stability (Vision 2030 2018).

8.4 Contribution and Implication of the Study

As regarding implications from both theoretical and practical perspectives, this research contributes to the literature through a proposed knowledge-sharing factors model in the incubator context. The study advances the understanding of knowledge-sharing factors and process, individual creativity and diffusion of innovation by applying it in the technology business incubator context. The implications are discussed as following.

8.4.1 Theoretical Implications

There are multiple theoretical contributions and implications that are resulted from the current research. First, this study contributes to the literature by presenting evidence to the body of knowledge in that it is the first research exploring the relation between knowledge-sharing factors and process, individual creativity and diffusion of innovation in the Saudi incubator context. The study's second contribution is the development of a framework having potential use in future studies. Consequently, this research contributes to the existing literature by proposing knowledge-sharing factors model in the Saudi Arabian incubator context. Also, the study advances the understanding of knowledge-sharing factors and process, individual creativity and diffusion of innovation by applying it in the Saudi Arabian technology business incubator context.

Third, the proposed hypotheses of this research are investigated so all enhance the literature for developing hypotheses in future research. Moreover, this research contributes to several success factors utilized in the proposed conceptual model through survey instrument validation.

Fourth, as discussed in the beginning of this chapter, this study confirmed that there are various factors of the knowledge-sharing process, individual creativity and diffusion of innovation are positively related Saudi Arabian technology business incubator

performance. Additionally, there are new insights are revealed for incubators when considering the success factors of technology business incubator performance; in particular, it is better for incubators' management to consider the emphasis they place on knowledge sharing organizational and individual success factors if they want to encourage the knowledge-sharing process in the incubators to produce massive digitized knowledge contents that can serve the national transformation plans to transform to a knowledge-based society and economy.

Finally, this study provides a noteworthy foundation for discussion that supports the success factors of technology business incubator performance, which scholars can use to extend the results of this research.

8.5 Practical Implications

This research has numerous practical implications. First, providing several success motivational factors for technology business incubators' performance discussed in this research, such as the knowledge-sharing process (donation and collection) with its implication of sub factors in knowledge-sharing organizational factors (management support, IT support and motivational rewards) and knowledge-sharing individual factors (interpersonal trust, enjoyment in sharing and self-efficacy). In addition to that, providing other factors in relation with the performance of technology business incubators, such as individual creativity (expertise, creative thinking skill, and intrinsic task motivation) and diffusion of innovation (relative advantage, compatibility and complexity). These factors could work as guidelines in order to improve the performance of technology business incubators in general and in Saudi Arabia in particular.

Second, practically, thus, in an effort to encourage employees to adopt knowledge-

sharing processes, Saudi technology incubators should apply supportive knowledge-sharing processes within the organizations. As a result, the incubators' stakeholders will take advantages from knowledge sharing that will improve the organization's goals achievement.

Third, the Saudi incubators are designed for technology innovations, which are mainly established to serve as knowledge-based programs to produce opportunities that lead to transforming the country into a knowledge-based society and, in consequence, developing a knowledge-based economy. The results of this study may help the decision-makers in incubators to modify their strategy and increase the outcome of their organizations by focusing on the knowledge-sharing factors, innovation and creativity. In other words, the key findings of this research may help Saudi Arabian technology business incubators to consider the success factors presented in this study in which they should pay more attention in order to ensure that they have better formulated the incubation process and efficient performance.

Fourth, the findings of this study could be used by Saudi Arabia technology business incubators in order to help incubatee in fostering the process of flourishing their innovative projects and consequently, the incubators' performance

Finally, the outcomes of this study could be used incubators top management to support knowledge-sharing process facilities by developing information technology communications between incubatees and enhancing incubators' claim supporting this purpose.

8.6 Limitations and Direction for Future Research

Like most other research projects, this research has some limitations. First, the data were only collected in Saudi Arabian technology business incubators. Consequently, the

generalisability of the findings may be limited. Moreover, increasing the number of respondents (survey and interviewees) would have been beneficial in order to better evaluate the dependability of the results.

This research focused on knowledge-sharing process, individual creativity and diffusion of innovation in selected technology business incubators in Saudi Arabia. It studied the influence of these factors on the incubators' performance. However, due to budget and timeframe limitations, no comparative research was conducted for any developing country that has a similar or different setting. Hence, future research should be undertaken in this area. When the proposed conceptual model is examined in another developing country, future researchers or practitioners may generate different findings.

This research did not study all possible factors that could influence technology business incubators and the research model did not include all aspects of the knowledge-sharing process. Future studies could examine other factors that are likely to influence technology business incubators' performance in Saudi Arabia.

The survey questionnaire that was used in the quantitative part of this research was considered well conducted and simply administrated. It is recommended that future research use the questionnaire in order to further test it. That way, other academics can ensure that it becomes a reliable and valid mechanism.

The findings of this study found a strong relation between technology and the incubators' performance. Future study could consider the kind of the knowledge-sharing process – either tacit or explicit – that incubatees are performing in the technology business incubators in regard to which one these types is more effective than the other. Additional research could investigate this and may produce new findings.

After reviewing the literature during the investigation of this study, it has been

concluded that Saudi Arabia is rapidly joining the global movement of establishment of technology business incubators as a means of supporting SMEs and new businesses. Future research could be conducted into how improvement can be brought to these incubation systems in Saudi Arabia in order to bring them to the same level as international ones. Also, the main purpose of establishing these technology incubators is to encourage innovation. Future work could consider that how the knowledge-sharing process leads to innovative practice or innovations

Finally, a wider use of the SEM method in future studies could extend the presentation of results and allow for more elaborate findings and conclusions.

8.7Conclusion

This study has fulfilled its main purpose, which is examining the key factors influencing technology business performance in Saudi Arabia. The conceptual model of the study was conducted through existing theories and intensive literature review. The conceptual model of the study integrates the key conceptions from individual creativity and diffusion of innovation. Moreover, the major factors of the knowledge-sharing process of incubatees in technology business incubator in the Saudi context. This study is investigated through four main questions:(1) What are the factors influencing the knowledge-sharing process in the technology business incubator Saudi context? (2) How does the knowledge-sharing process (donation and collection) influence technology business incubator performances in the Saudi context? (3) How do individual creativity factors of incubatees' influence technology business incubator performances in Saudi context? (4) How do diffusion of innovation factors of incubatees' influence technology business incubator performance in the Saudi context?

In order to empirically answer these questions, 13 hypotheses were conducted that guide the proposed study.

This research applied mixed methods (quantitative & qualitative) through two stages. Stage one of the research study employed quantitative method; survey was used to collect the data from the study sample about their influencing factors used in the research framework. Stage 2 of the research study employed a qualitative research method through semi-structured interviews to validate the quantitative results and provide more insights about the factors relations.

Previously, in order to ensure the study was solid in approach and design, the qualitative method was established through using validated instruments. The data collection process targeted incubatees in technology business incubators in Saudi Arabia resulting in 340 responses used for analysis. For case study approach, 10 interviews were conducted with the key positions staff in two incubators.

For quantitative data analysis, a number of statistical technique were conducted using descriptive data analyses and multivariate: partial least squares (PLS), Smart PLS version 3-based structural equation modeling (SEM) technique, exploratory factor, analysis and (EFA) and confirmatory factor analysis (CFA).

Out of the 13 hypotheses, H1b, H3a, H4a, H9 and H10 were not supported. The findings indicated that, for the knowledge-sharing process organizational factors, IT support positively influences the knowledge-sharing process (donation and collection) while senior management support positively influences knowledge donation and motivational rewards positively influence knowledge collection only in Saudi Arabian technology business incubators. In addition to this, individual factors (enjoyment in sharing and self-efficacy) positively impact the knowledge-sharing process (donation

and collection) while interpersonal trust positively impacts knowledge collection only in the technology business incubator in the Saudi context. Among other influence factors, the knowledge-sharing process (donation and collection) of intrinsic task motivation, complexity, compatibility and relative advantage are crucial in Saudi Arabian technology business incubator performance.

8.8 Chapter Summary

This chapter presented a detailed discussion for the thesis and the results of the research. Also, the implications of the research are provided in this chapter through drawing the theoretical implications in addition to the practical implications. Finally, the chapter concludes with presenting the study limitations in addition to the recommendations for upcoming potential research.

References

Abetti, P.A. 2004, 'Government-supported incubators in the Helsinki region, Finland: infrastructure, results, and best practices', *The Journal of Technology Transfer*, vol. 29, no. 1, pp. 19-40.

Adelowo, C.M., Ilori, M.O., Siyanbola, W.O. & Oluwale, B.A. 2015, 'Technological learning mechanisms in Nigeria's technology incubation centre', *African Journal of Economic and Management Studies*, vol. 6, no. 1, pp. 72-89.

Agnete Alsos, G., Hytti, U. & Ljunggren, E. 2011, 'Stakeholder theory approach to technology incubators', *International Journal of Entrepreneurial Behavior & Research*, vol. 17, no. 6, pp. 607-25.

Akçomak, İ.S. & Taymaz, E. 2004, 'Assessing the effectiveness of incubators: the case of Turkey', *METU Economic Research Center*, pp. 1-18.

Al-Filali, I.Y. & Gallarotti, G.M. 2012, 'Smart development: Saudi Arabia's quest for a knowledge economy', *International Studies*, vol. 49, no. 1-2, pp. 47-76.

Al-Mubaraki, H. 2008, 'Procurement of international business incubation– Quantitative and Qualitative approaches', *Melrose Books*.

Al-Mubaraki, H., Al-Karaghouli, W. & Busler, M. 2010, 'The creation of business incubators in supporting economic developments', *European, Mediterranean & Middle Eastern Conference on Information Systems*, pp. 12-3.

Al-Mubaraki, H. & Schröl, H. 2011, 'Measuring the effectiveness of business incubators: a four dimensions approach from a gulf cooperation council perspective', *Journal of Enterprising Culture*, vol. 19, no. 04, pp. 435-52.

Al-Mubaraki, H. & Wong, S.F. 2011, 'How valuable are business incubators? A case illustration of their performance indicators', *European, Mediterranean & Middle Eastern Conference on Information Systems*, vol. 2011, p. 30.

Al-Ohali, M. & Shin, J.C. 2013, 'Knowledge-based innovation and research productivity in Saudi Arabia', *Higher Education in Saudi Arabia*, Springer, pp. 95-102.

Alamoudi, R.B., Abdullah 2017, 'How to Encourage Entrepreneurship and New Business in the Kingdom of Saudi Arabia:

Research on Regulations, Policies and Obstacles', *International Journal of Basic & Applied Sciences*, vol. Vol:17 No:03

Albort-Morant, G. & Ribeiro-Soriano, D. 2016, 'A bibliometric analysis of international impact of business incubators', *Journal of Business Research*, vol. 69, no. 5, pp. 1775-9.

Allen, D.N. 1985, 'An entrepreneurial marriage: business incubators and startups', *Frontiers of Entrepreneurship Research, Entrepreneurship Research conference, Babson College, Centre for Entrepreneurship studies*, pp. 38-53.

Allen, D.N. & Rahman, S. 1985, 'Small business incubators: a positive environment for entrepreneurship', *Journal of Small Business Management (pre-1986)*, vol. 23, no. 000003, p. 12.
Alshayea, A. 2013, 'Scientific Research in the Kingdom of Saudi Arabia: Potential for Excellence and Indicators of Underdevelopment', *Higher Education Studies*, vol. 3, no. 5, pp. 47-51.
Alshumaimri, A., Aldridge, T. & Audretsch, D.B. 2010, 'The university technology transfer revolution in Saudi Arabia', *The Journal of Technology Transfer*, vol. 35, no. 6, pp. 585-96.
Alshuwaikhat, H.M. & Mohammed, I. 2017, 'Sustainability matters in national development visions—Evidence from Saudi Arabia's Vision for 2030', *Sustainability*, vol. 9, no. 3, p. 408.
Alsodais, S. 2013, 'Science, Technology & Innovation in Saudi Arabia', *WIPO | Magazine*, vol. 5/2013.
Altbach, P.G. 2013, 'Advancing the national and global knowledge economy: the role of research universities in developing countries', *Studies in higher education*, vol. 38, no. 3, pp. 316-30.
Amabile, T.M. 1988, 'A model of creativity and innovation in organizations', *Research in organizational behavior*, vol. 10, no. 1, pp. 123-67.
Amabile, T.M. 1997, 'Motivating Creativity in Organizations: On Doing What You Love and Loving What You Do', *California Management Review*, vol. 40, no. 1, pp. 39-58.
Amabile, T.M. 1998, 'How to kill creativity (pp. 77-87)', *Harvard Business School Publishing*.
Amabile, T.M., Barsade, S.G., Mueller, J.S. & Staw, B.M. 2005, 'Affect and Creativity at Work', *Administrative Science Quarterly*, vol. 50, no. 3, pp. 367-403.
Amabile, T.M., Conti, R., Coon, H., Lazenby, J. & Herron, M. 1996, 'ASSESSING THE WORK ENVIRONMENT FOR CREATIVITY', *Academy of Management Journal*, vol. 39, no. 5, pp. 1154-84.
Arab news 2012, *Badir technology incubators adopt 71 projects for Saudi innovators*, viewed 04 March 2016, < http://www.arabnews.com/badir-technology-incubators-adopt-71-projects-saudi-innovators>.
Ardichvili, A., Page, V. & Wentling, T. 2003, 'Motivation and barriers to participation in virtual knowledge-sharing communities of practice', *Journal of knowledge management*, vol. 7, no. 1, pp. 64-77.
Arfken, C.L., Madeja, C. & Owens, D. 2015, 'Comparison of synthetic substances: Diffusion of innovation framework', *Drug & Alcohol Dependence*, vol. 146, pp. e209-e10.
Arieti, S. 1976, 'Creativity: The magic synthesis'.
Artail, H.A. 2006, 'Application of KM measures to the impact of a specialized groupware system on corporate productivity and operations', *Information & Management*, vol. 43, no. 4, pp. 551-64.
Ascigil, S.F. & Magner, N.R. 2009, 'Business incubators: leveraging skill utilization through social capital', *Journal of Small Business Strategy*, vol. 20, no. 1, p. 19.
Aswad, N.G., Vidican, G. & Samulewicz, D. 2011, 'Creating a knowledge-based economy in the United Arab Emirates: Realising the unfulfilled potential of women in the science, technology and engineering fields', *European journal of engineering education*, vol. 36, no. 6, pp. 559-70.

Autant-Bernard, C., Fadairo, M. & Massard, N. 2013, 'Knowledge diffusion and innovation policies within the European regions: Challenges based on recent empirical evidence', *Research Policy*, vol. 42, no. 1, pp. 196-210.
Babbage, C. 1832, 'On the economy of machinery and manufactures'.
Babbie, E.R. 2013, *The basics of social research*, Cengage Learning.
Bandura, A. 1997, *Self-efficacy: The exercise of control*, Macmillan.
Barbero, J.L., Casillas, J.C., Wright, M. & Garcia, A.R. 2014, 'Do different types of incubators produce different types of innovations?', *The Journal of Technology Transfer*, vol. 39, no. 2, pp. 151-68.
Bartol, K.M. & Srivastava, A. 2002, 'Encouraging Knowledge Sharing: The Role of Organizational Reward Systems', *Journal of Leadership & Organizational Studies*, vol. 9, no. 1, pp. 64-76.
Bates, R. & Khasawneh, S. 2005, 'Organizational learning culture, learning transfer climate and perceived innovation in Jordanian organizations', *International journal of training and development*, vol. 9, no. 2, pp. 96-109.
Bélanger, F. & Crossler, R.E. 2011, 'Privacy in the digital age: a review of information privacy research in information systems', *MIS quarterly*, vol. 35, no. 4, pp. 1017-42.
Bergek, A. & Norrman, C. 2008a, 'Incubator best practice: A framework', *Technovation*, vol. 28, no. 1-2, pp. 20-8.
Bergek, A. & Norrman, C. 2008b, 'Incubator best practice: A framework', *Technovation*, vol. 28, no. 1, pp. 20-8.
Betz, F. 1987, *Managing technology: competing through new ventures, innovation, and corporate research*, Prentice Hall.
Bhabra, R.K. 2014, 'An examination of growth stages and factors affecting the performance of business incubators: the case of Australia'.
Bijlsma, K. & Koopman, P. 2003, 'Introduction: trust within organisations', *Personnel Review*, vol. 32, no. 5, pp. 543-55.
Binsawad, M., Hawryszkiewycz, I. & Kang, K. 2016, 'Saudi Technology Incubation: an Analysis and Indication of Gaps in Functioning'.
Binsawad, M., Sohaib, O. & Hawryszkiewycz, I. 2019, 'Factors Impacting Technology Business Incubator Performance', *International Journal of Innovation Management*, vol. 23, no. 01, p. 1950007.
Bock, G.-W. & Kim, Y.-G. 2001, 'Breaking the myths of rewards: An exploratory study of attitudes about knowledge sharing', *Pacis 2001 proceedings*, p. 78.
Bøllingtoft, A. 2012, 'The bottom-up business incubator: Leverage to networking and cooperation practices in a self-generated, entrepreneurial-enabled environment', *Technovation*, vol. 32, no. 5, pp. 304-15.
Bøllingtoft, A. & Ulhøi, J.P. 2005, 'The networked business incubator—leveraging entrepreneurial agency?', *Journal of business venturing*, vol. 20, no. 2, pp. 265-90.
Boschma, R. 2005, 'Proximity and innovation: a critical assessment', *Regional studies*, vol. 39, no. 1, pp. 61-74.
Brush, C.G., Greene, P.G. & Hart, M.M. 2001, 'From initial idea to unique advantage: The entrepreneurial challenge of constructing a resource base', *The academy of management executive*, vol. 15, no. 1, pp. 64-78.
Carlson, C.R. & Wilmot, W.W. 2006, *Innovation: The five disciplines for creating what customers want*, Crown Business.

Chambers, M.V., Knud Erik Serup 2011, 'Thematic Working Group Report on Incubators for Creative Entrepreneurs based on 27 case studies-Creative Growth', pp. pp.3-63.
Chan, K. & Lau, T. 2005, 'Assessing technology incubator programs in the science park: the good, the bad and the ugly', *Technovation*, vol. 25, no. 10, pp. 1215-28.
Chen, C.-J. 2009, 'Technology commercialization, incubator and venture capital, and new venture performance', *Journal of Business research*, vol. 62, no. 1, pp. 93-103.
Cheng, F., van Oort, F., Geertman, S. & Hooimeijer, P. 2014, 'Science Parks and the Co-location of High-tech Small-and Medium-sized Firms in China's Shenzhen', *Urban studies*, vol. 51, no. 5, pp. 1073-89.
Cheng, S. & Schaeffer, P.V. 2011, 'Evaluation without Bias: A methodological perspective on performance measures for business incubators', *Region et Developement*, vol. 33, pp. 211-25.
Chin, W.W. 1998, 'The partial least squares approach to structural equation modeling', *Modern methods for business research*, vol. 295, no. 2, pp. 295-336.
Chin, W.W., Marcolin, B.L. & Newsted, P.R. 2003, 'A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study', *Information systems research*, vol. 14, no. 2, pp. 189-217.
Christian, M.R. & Sarstedt, M. 2016, 'Gain more insight from your PLS-SEM results: The importance-performance map analysis', *Industrial Management & Data Systems*, vol. 116, no. 9, pp. 1865-86.
Chugh, R. 2013, 'Workplace Dimensions: Tacit Knowledge Sharing in Universities', *Journal of Advanced Management Science*, vol. 1, no. 1, pp. 24-8.
Co-operation, O.f.E. & Development 1997, 'Technology Incubators: Nurturing Small Firms', OECD Publishing Paris.
Co-operation, O.f.E. & Development 1997a, 'Technology Incubators: Nurturing Small Firms', OECD Publishing Paris, pp. 13-30.
Connell, J., Kriz, A. & Thorpe, M. 2014, 'Industry clusters: an antidote for knowledge sharing and collaborative innovation?', *Journal of Knowledge Management*, vol. 18, no. 1, pp. 137-51.
Connelly, C.E. & Kevin Kelloway, E. 2003, 'Predictors of employees' perceptions of knowledge sharing cultures', *Leadership & Organization Development Journal*, vol. 24, no. 5, pp. 294-301.
Conner, K.R. & Prahalad, C.K. 1996, 'A resource-based theory of the firm: Knowledge versus opportunism', *Organization science*, vol. 7, no. 5, pp. 477-501.
Cooper, D.R., Schindler, P.S. & Sun, J. 2011, *Business research methods*, vol. 9, McGraw-Hill Irwin New York.
Corsi, C. & Di Berardino, D. 2014, 'ASSESSING THE BUSINESS INCUBATORS'PERFORMANCE REFERRING THE LOCAL DEVELOPMENT IN ITALY', *European Scientific Journal, ESJ*, vol. 10, no. 10.
Creswell, J.W. 2003, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, SAGE.
Creswell, J.W. & Clark, V.L.P. 2007, 'Designing and conducting mixed methods research'.

Creswell, J.W., Plano Clark, V.L., Gutmann, M.L. & Hanson, W.E. 2003, 'Advanced mixed methods research designs', *Handbook of mixed methods in social and behavioral research*, vol. 209, p. 240.
Cronbach, L.J. 1971, 'Test validation', *Educational measurement*.
Csikszentmihalyi, M. & Wolfe, R. 2014, 'New conceptions and research approaches to creativity: Implications of a systems perspective for creativity in education', *The systems model of creativity*, Springer, pp. 161-84.
Culp, R.P. 1996, 'A test of business growth through analysis of a technology incubator program', Georgia Institute of Technology.
Damanpour, F. 1996, 'Organizational complexity and innovation: developing and testing multiple contingency models', *Management science*, vol. 42, no. 5, pp. 693-716.
Davenport, T.H. & Prusak, L. 1998, *Working knowledge: How organizations manage what they know*, Harvard Business Press.
De Vries, R.E., Van den Hooff, B. & de Ridder, J.A. 2006, 'Explaining knowledge sharing: The role of team communication styles, job satisfaction, and performance beliefs', *Communication research*, vol. 33, no. 2, pp. 115-35.
Díez-Vial, I. & Fernández-Olmos, M. 2015, 'Knowledge spillovers in science and technology parks: how can firms benefit most?', *The Journal of Technology Transfer*, vol. 40, no. 1, pp. 70-84.
Dutt, N., Hawn, O., Vidal, E., Chatterji, A., McGahan, A. & Mitchell, W. 2016, 'How open system intermediaries address institutional failures: The case of business incubators in emerging-market countries', *Academy of Management Journal*, vol. 59, no. 3, pp. 818-40.
Easterby-Smith, M.T. & Thorpe, R. 2002, 'R. and Lowe, A.(2002)', *Management research: an introduction*, vol. 2, p. 342.
Egbetokun, A., Siyanbola, W. & Adeniyi, A. 2007, 'Assessment of Innovation Capability in the Cable and Wire Manufacturing Industry in Nigeria: a case study approach', *Micro Evidence on Innovation in developing Economies [MEIDE], May*.
Elmulthum, N. & Elsayed, I. 2017, 'Prospects of Saudi Women's Contribution to Job Market under Saudi Vision 2030: An Empirical Analysis 1999-2015', *International Journal of Applied Sociology*, vol. 7, no. 1, pp. 20-7.
Erickson, G.S., Rothberg, H. & Carr, C. 2003, 'Knowledge-Sharing in Value-Chain Networks: Certifying Collaborators for Effective Protection Process'.
F. Hair Jr, J., Sarstedt, M., Hopkins, L. & G. Kuppelwieser, V. 2014, 'Partial least squares structural equation modeling (PLS-SEM) An emerging tool in business research', *European Business Review*, vol. 26, no. 2, pp. 106-21.
Fennell, M.L. & Warnecke, R.B. 2013, *The diffusion of medical innovations: An applied network analysis*, Springer Science & Business Media.
Field, A. 2009, *Discovering statistics using SPSS*, Sage publications.
Fukuyama, F. 1995, *Trust: The social virtues and the creation of prosperity*, Free Press Paperbacks.
Gately, C. & Cunningham, J. 2014, 'The contributions and disconnections between writing a business plan and the start-up process for incubator technology entrepreneurs', *Academic entrepreneurship: Creating an entrepreneurial ecosystem*, Emerald Group Publishing Limited, pp. 197-241.

George, J.M. & Zhou, J. 2002, 'Understanding when bad moods foster creativity and good ones don't: The role of context and clarity of feelings', *Journal of Applied Psychology*, vol. 87, no. 4, pp. 687-97.
Gerbing, D.W. & Anderson, J.C. 1988, 'An updated paradigm for scale development incorporating unidimensionality and its assessment', *Journal of marketing research*, pp. 186-92.
Gerhart, B. & Fang, M. 2015, 'Pay, intrinsic motivation, extrinsic motivation, performance, and creativity in the workplace: Revisiting long-held beliefs', *Annu. Rev. Organ. Psychol. Organ. Behav.*, vol. 2, no. 1, pp. 489-521.
Getzels, J.W. & Jackson, P.W. 1962, 'Creativity and intelligence: Explorations with gifted students'.
Gist, M.E. 1987, 'Self-Efficacy: Implications for Organizational Behavior and Human Resource Management', *Academy of Management Review*, vol. 12, no. 3, pp. 472-85.
Gist, M.E. & Mitchell, T.R. 1992, 'Self-efficacy: A theoretical analysis of its determinants and malleability', *Academy of Management review*, vol. 17, no. 2, pp. 183-211.
Greene, P.G. & Butler, J.S. 1996, 'The minority community as a natural business incubator', *Journal of Business Research*, vol. 36, no. 1, pp. 51-8.
Grewal, D., Levy, M. & Kumar, V. 2009, 'Customer Experience Management in Retailing: An Organizing Framework', *Journal of Retailing*, vol. 85, no. 1, pp. 1-14.
Grossman, G.M. & Helpman, E. 1993, *Innovation and growth in the global economy*, MIT press.
Guceri-Ucar, G. & Koch, S. 2013, 'Business Incubation Practices and Software Start-up Success in Turkey', *International Conference of Software Business*, Springer, pp. 178-82.
Guceri-Ucar, G. & Koch, S. 2016, 'Exploring business incubation practices and relationships to drivers of start-up success in Turkey', *International Journal of Entrepreneurship and Innovation Management*, vol. 20, no. 1-2, pp. 1-19.
Gupta, A.K. & Govindarajan, V. 2000a, 'Knowledge flows within multinational corporations', *Strategic management journal*, pp. 473-96.
Gupta, A.K. & Govindarajan, V. 2000b, 'Knowledge management's social dimension: Lessons from Nucor Steel', *MIT Sloan Management Review*, vol. 42, no. 1, p. 71.
Haenlein, M. & Kaplan, A.M. 2004, 'A beginner's guide to partial least squares analysis', *Understanding statistics*, vol. 3, no. 4, pp. 283-97.
Hahn, M.H., Lee, K.C. & Lee, D.S. 2013, 'Network structure, organizational learning culture, and employee creativity in system integration companies: The mediating effects of exploitation and exploration', *Computers in Human Behavior*, no. 0.
Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E. & Tatham, R.L. 2006, 'Multivariate data analysis 6th ed', *Uppersaddle River: Pearson Prentice Hall*.
Hair, J.F., Ringle, C.M. & Sarstedt, M. 2011, 'PLS-SEM: Indeed a silver bullet', *Journal of Marketing theory and Practice*, vol. 19, no. 2, pp. 139-52.
Han, B.M. & Anantatmula, V.S. 2007, 'Knowledge sharing in large IT organizations: a case study', *VINE*, vol. 37, no. 4, pp. 421-39.
Hau, Y.S., Kim, B., Lee, H. & Kim, Y.-G. 2013, 'The effects of individual motivations and social capital on employees' tacit and explicit knowledge sharing

intentions', *International Journal of Information Management*, vol. 33, no. 2, pp. 356-66.
Hendriks, P. 1999, 'Why share knowledge? The influence of ICT on the motivation for knowledge sharing', *Knowledge and process management*, vol. 6, no. 2, pp. 91-100.
Henseler, J., Ringle, C.M. & Sinkovics, R.R. 2009a, 'The use of partial least squares path modeling in international marketing', *New challenges to international marketing*, Emerald Group Publishing Limited, pp. 277-319.
Henseler, J., Ringle, C.M. & Sinkovics, R.R. 2009b, 'The use of partial least squares path modeling in international marketing', *New Challenges to International Marketing (Advances in International Marketing)*, vol. 20, pp. 277 - 319.
Henseler, J. & Sarstedt, M. 2013, 'Goodness-of-fit indices for partial least squares path modeling', *Computational Statistics*, vol. 28, no. 2, pp. 565-80.
Hill, C.W., Jones, G.R. & Schilling, M.A. 2014, *Strategic management: theory: an integrated approach*, Cengage Learning.
Hinkin, T.R. 1998, 'A brief tutorial on the development of measures for use in survey questionnaires', *Organizational research methods*, vol. 1, no. 1, pp. 104-21.
Hjorth, D. 2013, 'Public entrepreneurship: Desiring social change, creating sociality', *Entrepreneurship & Regional Development*, vol. 25, no. 1-2, pp. 34-51.
Hock, C., Ringle, C. & Sarstedt, M. 2010, *Management of Multi-Purpose Stadiums: Importance and Performance Measurement of Service Interfaces*, vol. 14.
Hodge, K.A. & Lear, J.L. 2011, 'Employment Skills for 21st Century Workplace: The Gap Between Faculty and Student Perceptions', *Journal of Career and Technical Education*, vol. 26, no. 2.
Hong, J. & Lu, J. 2016, 'Assessing the effectiveness of business incubators in fostering SMEs: evidence from China', *International Journal of Entrepreneurship and Innovation Management*, vol. 20, no. 1-2, pp. 45-60.
Hsieh, H.-N., Hu, T.-S., Chia, P.-C. & Liu, C.-C. 2014, 'Knowledge patterns and spatial dynamics of industrial districts in knowledge cities: Hsinchu, Taiwan', *Expert Systems with Applications*, vol. 41, no. 12, pp. 5587-96.
Hsu, I.C. 2008, 'Knowledge sharing practices as a facilitating factor for improving organizational performance through human capital: A preliminary test', *Expert Systems with Applications*, vol. 35, no. 3, pp. 1316-26.
Hu, T.-S. 2008, 'Interaction among high-tech talent and its impact on innovation performance: A comparison of Taiwanese science parks at different stages of development', *European Planning Studies*, vol. 16, no. 2, pp. 163-87.
Hu, T.-S., Chang, S.-L. & Chen, K.-C. 2015, 'Incubators, networks, and their performance: an in-depth case study in Taiwan', *International Journal of Business Environment*, vol. 7, no. 3, pp. 281-301.
Huang, X., Hsieh, J. & He, W. 2014, 'Expertise dissimilarity and creativity: The contingent roles of tacit and explicit knowledge sharing', *Journal of Applied Psychology*, vol. 99, no. 5, p. 816.
Hughes, M., Ireland, R.D. & Morgan, R.E. 2007, 'Stimulating Dynamic Value: Social Capital and Business Incubation as a Pathway to Competitive Success', *Long Range Planning*, vol. 40, no. 2, pp. 154-77.

Islam, M.M., Bokhari, A.A.H. & Abalala, T.S. 2018, 'Perceptions to Start up Business as a Career Choice among Saudi Female Higher Education Students', *Societies*, vol. 8, no. 2, p. 31.
Ismail Al-Alawi, A., Yousif Al-Marzooqi, N. & Fraidoon Mohammed, Y. 2007, 'Organizational culture and knowledge sharing: critical success factors', *Journal of knowledge management*, vol. 11, no. 2, pp. 22-42.
Jamil, F., Ismail, K., Siddique, M., Khan, M.M., Kazi, A.G. & Qureshi, M.I. 2016, 'Business incubators in asian developing countries', *International Review of Management and Marketing*, vol. 6, no. 4S.
Jolaee, A., Md Nor, K., Khani, N. & Md Yusoff, R. 2014, 'Factors affecting knowledge sharing intention among academic staff', *International Journal of Educational Management*, vol. 28, no. 4, pp. 413-31.
Jurgenson, S., Bayyari, F.M. & Parker, J. 2016, 'A comprehensive renewable energy program for Saudi Vision 2030', Elsevier.
Kharabsheh, R.A. 2007, 'A model of antecedents of knowledge sharing', *Electronic Journal of Knowledge Management*, vol. 5, no. 4, pp. 419-26.
Khorsheed, M.S. 2015, 'Saudi Arabia: from oil kingdom to knowledge‐based economy', *Middle East Policy*, vol. 22, no. 3, pp. 147-57.
Khorsheed, M.S. & Al-Fawzan, M.A. 2014, 'Fostering university–industry collaboration in Saudi Arabia through technology innovation centers', *Innovation*, vol. 16, no. 2, pp. 224-37.
Khorsheed, M.S., Al-Fawzan, M.A. & Al-Hargan, A. 2014, 'Promoting techno-entrepreneurship through incubation: An overview at BADIR program for technology incubators', *Innovation*, vol. 16, no. 2, pp. 238-49.
Khorsheed, M.S., Alhargan, A. & Qasim, S.M. 2012, 'A Three-Tier service model for national ICT incubator in Saudi Arabia', *Proceedings of IEEE International Conference on Management and Service Science*, pp. 1-6.
Kim, S. & Lee, H. 2004, 'Organizational factors affecting knowledge sharing capabilities in e-government: An empirical study', *IFIP International Working Conference on Knowledge Management in Electronic Government*, Springer, pp. 281-93.
King, N. & Anderson, N. 1990, 'Innovation in working groups'.
Kinninmont, J. & Kinninmont, J. 2017, *Vision 2030 and Saudi Arabia's Social Contract: Austerity and Transformation*, Chatham House.
Kline, R. 2011, 'Principles and practice of structural equation modeling 2011 3rd ed. New York', NY Guilford Press.
Kline, R.B. 2005, 'Principles and practice of structural equation modeling 2nd edition guilford press', *New York*.
Koestler, A. 1964, 'The act of creation'.
Kreuger, L.W. & Neuman, W.L. 2006, 'Social work research methods: Qualitative and quantitative applications', *Boston and New York: Pearson & Allyn Bacon*.
Lee, H. & Choi, B. 2003, 'Knowledge management enablers, processes, and organizational performance: An integrative view and empirical examination', *Journal of management information systems*, vol. 20, no. 1, pp. 179-228.
Lee, S.M. & Hong, S. 2002, 'An enterprise-wide knowledge management system infrastructure', *Industrial Management & Data Systems*, vol. 102, no. 1, pp. 17-25.

Lee, S.Y., Florida, R. & Acs, Z. 2004, 'Creativity and entrepreneurship: A regional analysis of new firm formation', *Regional studies*, vol. 38, no. 8, pp. 879-91.
Lewis, D.A., Harper-Anderson, E. & Molnar, L.A. 2011, 'Incubating success. Incubation best practices that lead to successful new ventures', *Ann Arbor: Institute for Research on Labor, Employment, and Development*, pp. 1-144.
Liao, S.-H., Fei, W.-C. & Chen, C.-C. 2007, 'Knowledge sharing, absorptive capacity, and innovation capability: an empirical study of Taiwan's knowledge-intensive industries', *Journal of Information Science*, vol. 33, no. 3, pp. 340-59.
Liebowitz, J. 2001, 'Knowledge management and its link to artificial intelligence', *Expert Systems with Applications*, vol. 20, no. 1, pp. 1-6.
Lin, H.F. 2007, 'Knowledge sharing and firm innovation capability: an empirical study', *International Journal of Manpower*, vol. 28, no. 3/4, pp. 315-32.
Lin, K., Hu, T., Hsieh, H. & Chia, P. 2012, 'Industrial cluster formation and evolution: The case of Hsinchu area', *Journal of Architecture and Planning*, vol. 13, no. 1, pp. 45-74.
Lis, A.M. & Romanowska, E. 2016, 'Shaping the Brand Awareness of Science and Technology Parks in Eastern Poland', *Barometr Regionalny. Analizy i prognozy*, vol. 2, pp. 147-56.
Łobejko, S. & Sosnowska, A. 2015, 'Management Models of a Science and Technology Parks: Foreign Experiences and Recommendations For Poland'.
Löfsten, H. 2016, 'Business and innovation resources: Determinants for the survival of new technology-based firms', *Management Decision*, vol. 54, no. 1, pp. 88-106.
Löfsten, H. & Lindelöf, P. 2002, 'Science Parks and the growth of new technology-based firms—academic-industry links, innovation and markets', *Research policy*, vol. 31, no. 6, pp. 859-76.
Long, J.S. & Andrews, F.M. 1981, 'Scientific Productivity: The Effectiveness of Research Groups in Six Countries', *Contemporary Sociology*, vol. 10, no. 3, p. 419.
Lumpkin, J.R. & Ireland, R.D. 1988, 'Screening practices of new business incubators: the evaluation of critical success factors', *American Journal of Small Business*, vol. 12, no. 4, pp. 59-81.
Lundqvist, M.A. 2014, 'The importance of surrogate entrepreneurship for incubated Swedish technology ventures', *Technovation*, vol. 34, no. 2, pp. 93-100.
Lunenburg, F.C. 2011, 'Self-efficacy in the workplace: Implications for motivation and performance', *International journal of management, business, and administration*, vol. 14, no. 1, pp. 1-6.
M'Chirgui, Z. 2012, 'Assessing the performance of business incubators: recent France evidence', *Business and Management Research*, vol. 1, no. 1, p. 62.
Ma, Z., Qi, L. & Wang, K. 2008, 'Knowledge sharing in Chinese construction project teams and its affecting factors', *Chinese Management Studies*, vol. 2, no. 2, pp. 97-108.
Mahmood, N., Jianfeng, C., Jamil, F., Munir, H., Jintao, L., Khan, M. & Cai, Y. 2015, 'Snapshot of technology business incubators in China', *International Journal of u-and e-Service, Science and Technology*, vol. 8, no. 7, pp. 235-42.

Mahmood, N., Jianfeng, C., Jamil, F., Munir, H., Lu, J., Khan, M. & Cai, Y. 2015, 'Snapshot of Technology Business Incubators in China', *International Journal of u- and e-Service, Science and Technology*, vol. 8, no. 7, pp. 235-42.
Mahmood, N., Jianfeng, C., Munir, H., Jamil, F. & Nusrat, A. 2016, 'The Role of University-Based Incubators in Developing Economies: Empirical Evidence from Pakistan', *International Journal of u-and e-Service, Science and Technology*, vol. 9, no. 11, pp. 143-52.
Majchrzak, A., Faraj, S., Kane, G.C. & Azad, B. 2013, 'The contradictory influence of social media affordances on online communal knowledge sharing', *Journal of Computer-Mediated Communication*, vol. 19, no. 1, pp. 38-55.
Mansano, F.H. & Pereira, M.F. 2016, 'Business incubators as support mechanisms for the economic development: Case of Maringá's Technology Incubator', *International Journal of Innovation*, vol. 4, no. 1, p. 23.
Marquis, D.G. 1969, 'The anatomy of successful innovations', *Innovation*, vol. 1, no. 7, pp. 28-37.
Marr, B., Schiuma, G. & Neely, A. 2004, 'Intellectual capital–defining key performance indicators for organizational knowledge assets', *Business Process Management Journal*, vol. 10, no. 5, pp. 551-69.
Martinsons, M.G., Davison, R.M. & Ou, C.X. 2015, 'Developing a New Theory of Knowledge Sharing: Documenting and Reflecting on a Messy Process', *Academy of Management Proceedings*, vol. 2015, Academy of Management, p. 11328.
Mas-Verdú, F., Ribeiro-Soriano, D. & Roig-Tierno, N. 2015, 'Firm survival: The role of incubators and business characteristics', *Journal of Business Research*, vol. 68, no. 4, pp. 793-6.
Matkin, G.W. 1990, *Technology Transfer and the University*, ERIC.
McLure Wasko, M. & Faraj, S. 2000, '"It is what one does": why people participate and help others in electronic communities of practice', *The Journal of Strategic Information Systems*, vol. 9, no. 2-3, pp. 155-73.
McMullan, E., Chrisman, J.J. & Vesper, K. 2001, 'Some problems in using subjective measures of effectiveness to evaluate entrepreneurial assistance programs', *Entrepreneurship Theory and Practice*, vol. 26, no. 1, pp. 37-54.
Merrifield, D.B. 1987, 'New business incubators', *Journal of business venturing*, vol. 2, no. 4, pp. 277-84.
Mian, S. 2016, 'Business incubation and incubator mechanisms', *TECHNOLOGY ENTREPRENEURSHIP AND BUSINESS INCUBATION: Theory• Practice• Lessons Learned*, pp. 1-33.
Mian, S., Lamine, W. & Fayolle, A. 2016, 'Technology Business Incubation: An overview of the state of knowledge', *Technovation*, vol. 50, pp. 1-12.
Mian, S.A. 1996, 'Assessing value-added contributions of university technology business incubators to tenant firms', *Research policy*, vol. 25, no. 3, pp. 325-35.
Mian, S.A. 1997, 'Assessing and managing the university technology business incubator: An integrative framework', *Journal of Business Venturing*, vol. 12, no. 4, pp. 251-85.
Mian, S.A. 2014, 'Business incubation mechanisms and new venture support: emerging structures of US science parks and incubators', *International Journal of Entrepreneurship and Small Business*, vol. 23, no. 4, pp. 419-35.

Mills, A.J., Durepos, G. & Wiebe, E. 2009, *Encyclopedia of case study research*, Sage Publications.
Mitchell, R. & Bernauer, T. 1998, 'Empirical research on international environmental policy: designing qualitative case studies', *The Journal of Environment & Development*, vol. 7, no. 1, pp. 4-31.
Mittal, S. & Dhar, R.L. 2015, 'Transformational leadership and employee creativity: mediating role of creative self-efficacy and moderating role of knowledge sharing', *Management Decision*, vol. 53, no. 5, pp. 894-910.
Mubarak AL-Mubaraki, H. & Busler, M. 2014, 'Incubator successes: Lessons learned from successful incubators towards the twenty-first century', *World Journal of Science, Technology and Sustainable Development*, vol. 11, no. 1, pp. 44-52.
Mumford, M.D., Hester, K.S. & Robledo, I.C. 2012, 'Creativity in Organizations', *Handbook of Organizational Creativity*, Elsevier, pp. 3-16, <http://dx.doi.org/10.1016/b978-0-12-374714-3.00001-x>.
Myers, M.D. 1997, 'Qualitative research in information systems', *Management Information Systems Quarterly*, vol. 21, no. 2, pp. 241-2.
Naisa, M.A.K. & Usman, B. 2016, 'The Impact of Information Technology on Entrepreneurship: A Case Study of Technology Incubation Center Kano Nigeria', *International Journal of Innovative Research and Development*, vol. 5, no. 1.
National Transformation Program 2020, viewed 27, May 2019, <https://vision2030.gov.sa/sites/default/files/NTP_En.pdf>.
Neuman, W.L. 2013, *Social research methods: Qualitative and quantitative approaches*, Pearson education.
Nijssen, E.J. & van der Borgh, M. 2017, 'Beyond the water cooler: using socialization to understand use and impact of networking services on collaboration in a business incubator', *R&D Management*, vol. 47, no. 3, pp. 443-57.
Nold, H.A. 2012, 'Linking knowledge processes with firm performance: organizational culture', *Journal of Intellectual Capital*, vol. 13, no. 1, pp. 16-38.
Nonaka, I., Kodama, M., Hirose, A. & Kohlbacher, F. 2014, 'Dynamic fractal organizations for promoting knowledge-based transformation – A new paradigm for organizational theory', *European Management Journal*, vol. 32, no. 1, pp. 137-46.
Nonaka, I. & Konno, N. 1998, 'The concept of "ba": Building a foundation for knowledge creation', *California management review*, vol. 40, no. 3, pp. 40-54.
Nonaka, I. & Takeuchi, H. 1995, *The knowledge-creating company: How Japanese companies create the dynamics of innovation*, Oxford university press.
Nurunnabi, M. 2017, 'Transformation from an oil-based economy to a knowledge-based economy in Saudi Arabia: the direction of Saudi vision 2030', *Journal of the Knowledge Economy*, vol. 8, no. 2, pp. 536-64.
Nyström, H. 1979, *Creativity and innovation*, John Wiley & Sons Inc.
Obaji, N.O., Senin, A.A. & Olugu, M.U. 2016, 'Supportive Government Policy as a Mechanism for Business Incubation Performance in Nigeria', *International Journal of Information Systems and Social Change (IJISSC)*, vol. 7, no. 4, pp. 52-66.

Okeke, U., Phillips, W., Roehrich, J. & Conway, S. 2017, 'The role of governance mechanisms on the diffusion of innovation in complex healthcare networks'.
Oldham, G.R. & Cummings, A. 1996, 'EMPLOYEE CREATIVITY: PERSONAL AND CONTEXTUAL FACTORS AT WORK', *Academy of Management Journal*, vol. 39, no. 3, pp. 607-34.
Othman, F., Hawryszkiewycz, I. & Kang, K. 2014, 'The Influence of Socio-technical Factors on Knowledge-based Innovation in Saudi Arabia Firms', ACIS.
Özdemir, Ö.Ç. & Şehito lu, Y. 2013, 'Assessing the impacts of technology business incubators: a framework for technology development centers in Turkey', *Procedia-Social and Behavioral Sciences*, vol. 75, pp. 282-91.
Pallant, J. 2007, 'SPSS survival manual, 3rd', *Edition. McGrath Hill*.
Panuwatwanich, K., Stewart, R. & Mohamed, S. 2008, 'Empirical Study on the Relationships between Climate for Innovation and Business Performance Outcomes in Design Firms', *Proceedings of the Eighth International Post-graduate Research Conference on the Built & Hu man Environment, Prague (Czech): Czech Technical University, CTU Publishing House*.
Park, N.K., Chun, M.Y. & Lee, J. 2016, 'Revisiting individual creativity assessment: Triangulation in subjective and objective assessment methods', *Creativity Research Journal*, vol. 28, no. 1, pp. 1-10.
Parke, M.R., Campbell, E.M. & Bartol, K.M. 2014, 'Setting the stage for virtual team development: Designing teams to foster knowledge sharing', *Academy of Management Proceedings*, vol. 2014, Academy of Management, p. 17244.
Parker, S., Congregado, E., Golpe, A. & Saxenian, A. 2015, '20 Incubators and Accelerators', *Concise Guide to Entrepreneurship, Technology and Innovation*, vol. 3, p. 108.
Parto, S. 2008, 'Innovation and Economic Activity: An Institutional Analysis of the Role of Clusters in Industrializing Economies', *Journal of Economic Issues*, vol. 42, no. 4, pp. 1005-30.
Patton, D. 2014, 'Realising potential: The impact of business incubation on the absorptive capacity of new technology-based firms', *International Small Business Journal*, vol. 32, no. 8, pp. 897-917.
Payne, R. 1990, *The effectiveness of research teams: A review*, John Wiley & Sons.
Peng, X. 2006, 'University spin-offs: Opportunity or challenge?', *Nature Materials*, vol. 5, no. 12, pp. 923-5.
Peres, R., Muller, E. & Mahajan, V. 2010, 'Innovation diffusion and new product growth models: A critical review and research directions', *International Journal of Research in Marketing*, vol. 27, no. 2, pp. 91-106.
Peters, L., Rice, M. & Sundararajan, M. 2004, 'The role of incubators in the entrepreneurial process', *The Journal of Technology Transfer*, vol. 29, no. 1, pp. 83-91.
Phan, P.H. & Lamine, S.A.M. 2016, *Technology entrepreneurship and business incubation: Theory, practice, lessons learned*, World Scientific.
Phan, P.H., Siegel, D.S. & Wright, M. 2005, 'Science parks and incubators: observations, synthesis and future research', *Journal of Business Venturing*, vol. 20, no. 2, pp. 165-82.
Phillips, J.M. & Gully, S.M. 2011, *Organizational behavior: Tools for success*, Cengage Learning.

Phillips, R.G. 2002, 'Technology business incubators: how effective as technology transfer mechanisms?', *Technology in Society*, vol. 24, no. 3, pp. 299-316.
Pinjani, P. & Palvia, P. 2013, 'Trust and knowledge sharing in diverse global virtual teams', *Information & Management*, vol. 50, no. 4, pp. 144-53.
Politis, J.D. 2003, 'The connection between trust and knowledge management: what are its implications for team performance', *Journal of knowledge management*, vol. 7, no. 5, pp. 55-66.
Rahab, S. 2011, 'Sudjono,"The Development Of Innovation Capability Of Small Medium Enterprises Through Knowledge Sharing Process: An Empirical Study Of Indonesian Creative Industry', *International Journal of Business and Social Science*, vol. 2, no. 21.
Riege, A. 2005a, 'Three-dozen knowledge-sharing barriers managers must consider', *Journal of knowledge management*, vol. 9, no. 3, pp. 18-35.
Riege, A. 2005b, 'Three‐dozen knowledge‐sharing barriers managers must consider', *Journal of Knowledge Management*, vol. 9, no. 3, pp. 18-35.
Robertson, S. & Kitagawa, F. 2011, 'University incubators and knowledge mediation strategies: Policy and practice in creating competitive city-regions', *LLAKES Research Paper*, vol. 28.
Robinson, L. 2009, 'A summary of diffusion of innovations', *Enabling change*.
Rogers, E.M. 2003, 'Elements of diffusion', *Diffusion of innovations*, vol. 5, no. 1.38.
Rogers, E.M. 2010, *Diffusion of innovations*, Simon and Schuster.
Rooney, D., Hearn, G. & Kastelle, T. 2012, 'Knowledge is people doing things, knowledge economies are people doing things with better outcomes for more people', *Handbook on the knowledge economy, volume two. Edward Elgar, Cheltenham and Northampton*, pp. 1-14.
Rothaermel, F.T. & Thursby, M. 2005a, 'Incubator firm failure or graduation?: The role of university linkages', *Research policy*, vol. 34, no. 7, pp. 1076-90.
Rothaermel, F.T. & Thursby, M. 2005b, 'University–incubator firm knowledge flows: assessing their impact on incubator firm performance', *Research Policy*, vol. 34, no. 3, pp. 305-20.
Rouse, M. 2005, *Incubator*, Tech Target, viewed Sep 28, 2015, <http://searchcio.techtarget.com/definition/incubator>.
Rowe, D. 2005, *Universities and Science Park based Technology Incubators*, University of Warwick Science Park Coventry.
Rubin, T.H., Aas, T.H. & Stead, A. 2015, 'Knowledge flow in technological business incubators: Evidence from Australia and Israel', *Technovation*, vol. 41, pp. 11-24.
Sahin, I. 2006, 'Detailed review of Rogers' diffusion of innovations theory and educational technology-related studies based on Rogers' theory', *TOJET: The Turkish Online Journal of Educational Technology*, vol. 5, no. 2.
Salem, M.I. 2014a, 'The Role Of Business Incubators In The Economic Development Of Saudi Arabia', *International Business & Economics Research Journal (IBER)*, vol. 13, no. 4, p. 853.
Salem, M.I. 2014b, 'The role of business incubators in the economic development of Saudi Arabia', *The International Business & Economics Research Journal (Online)*, vol. 13, no. 4, p. 853.
Samson, D. 1991, *Manufacturing and operations strategy*, Prentice Hall.

Sarstedt, M., Hair, J.F., Ringle, C.M., Thiele, K.O. & Gudergan, S.P. 2016, 'Estimation issues with PLS and CBSEM: Where the bias lies!', *Journal of Business Research*, vol. 69, no. 10, pp. 3998-4010.
Sarstedt, M., Ringle, C.M., Smith, D., Reams, R. & Hair Jr, J.F. 2014, 'Partial least squares structural equation modeling (PLS-SEM): A useful tool for family business researchers', *Journal of Family Business Strategy*, vol. 5, no. 1, pp. 105-15.
Scholl, H. 2005, 'Innovationas drivers of growth', paper presented to the *CBI Conference Synopsis Sharing Knowledge with the Business and Academic Communities*, Carnegie Bosch Institute for Applied Studies in International Management.
Schumpeter, J.A. 1934, *The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle*, vol. 55, Transaction publishers.
Schwab, K. & Sala-i-Martin, X. 2010, 'The global competitiveness report 2010-2011', Citeseer.
Schwartz-Shea, P. & Yanow, D. 2013, *Interpretive research design: Concepts and processes*, Routledge.
Seemann, K. 2003, 'Basic Principles in Holistic Technology Education', *Journal of Technology Education*, vol. 14, no. 2.
Sekaran, U. 2003, 'Research methods for business . Hoboken', NJ: John Wiley & Sons.
Shalaby, N. 2014, 'Business and Technology Incubation Initiatives in Saudi Arabia', *Chamber of Commerce and Industry Eastern Province*.
Shao, Z., Feng, Y. & Liu, L. 2012, 'The mediating effect of organizational culture and knowledge sharing on transformational leadership and Enterprise Resource Planning systems success: An empirical study in China', *Computers in Human Behavior*, vol. 28, no. 6, pp. 2400-13.
Sharp, B.E. & Miller, S.A. 2016, 'Potential for Integrating Diffusion of Innovation Principles into Life Cycle Assessment of Emerging Technologies', *Environmental science & technology*, vol. 50, no. 6, pp. 2771-81.
Simonton, D.K. 1999, *Origins of genius: Darwinian perspectives on creativity*, Oxford University Press.
Smilor, R.W. 1987a, 'Commercializing technology through new business incubators', *Research Management*, vol. 30, no. 5, pp. 36-41.
Smilor, R.W. 1987b, 'Managing the incubator system: Critical success factors to accelerate new company development', *IEEE Transactions on Engineering Management*, vol. EM-34, no. 3, pp. 146-55.
Smilor, R.W. 1987c, 'Managing the incubator system: critical success factors to accelerate new company development', *Engineering Management, IEEE Transactions on*, no. 3, pp. 146-55.
Smith, A. 1937, *An Inquiry into the Nature and Causes of the Wealth of Nations*, Рипол Классик.
Soetanto, D.P. & Jack, S.L. 2013, 'Business incubators and the networks of technology-based firms', *The Journal of Technology Transfer*, vol. 38, no. 4, pp. 432-53.
Somsuk, N. & Laosirihongthong, T. 2014, 'A fuzzy AHP to prioritize enabling factors for strategic management of university business incubators: Resource-

based view', *Technological Forecasting and Social Change*, vol. 85, pp. 198-210.
Song, D. 2009, 'The Tacit Knowledge-sharing Strategy Analysis in the Project Work', *International Business Research*, vol. 2, no. 1.
Sperber, A.D., Devellis, R.F. & Boehlecke, B. 1994, 'Cross-cultural translation: methodology and validation', *Journal of cross-cultural psychology*, vol. 25, no. 4, pp. 501-24.
Stokan, E., Thompson, L. & Mahu, R.J. 2015, 'Testing the differential effect of business incubators on firm growth', *Economic Development Quarterly*, vol. 29, no. 4, pp. 317-27.
Straub, D., Boudreau, M.-C. & Gefen, D. 2004, 'Validation guidelines for IS positivist research', *The Communications of the Association for Information Systems*, vol. 13, no. 1, p. 63.
Straub, D.W. 1989, 'Validating instruments in MIS research', *MIS quarterly*, pp. 147-69.
Studdard, N.L. 2006, 'The effectiveness of entrepreneurial firm's knowledge acquisition from a business incubator', *International Entrepreneurship and Management Journal*, vol. 2, no. 2, pp. 211-25.
Sungur, O. 2015, 'Business incubators, networking and firm survival: evidence from Turkey', *International Journal of Business and Social Science*, vol. 6, no. 5, pp. 136-49.
Tabachnick, B.G. & Fidell, L.S. 2007, *Using multivariate statistics*, Allyn & Bacon/Pearson Education.
Tadros, M.E. 2015, 'The Arab Gulf states and the knowledge economy: challenges and opportunities', Washington, DC: Arab Gulf States Institute. Google Scholar.
Tamasy, C. 2007, 'Rethinking Technology‐Oriented Business Incubators: Developing a Robust Policy Instrument for Entrepreneurship, Innovation, and Regional Development?', *Growth and Change*, vol. 38, no. 3, pp. 460-73.
Tamjidyamcholo, A., Gholipour, R., Baba, M.S.B. & Yamchello, H.T. 2013, 'Information security professional perceptions of knowledge-sharing intention in virtual communities under social cognitive theory', *Research and Innovation in Information Systems (ICRIIS), 2013 International Conference on*, IEEE, pp. 416-21.
Tang, M., Baskaran, A., Pancholi, J. & Lu, Y. 2013, 'Technology business incubators in China and India: A comparative analysis', *Journal of Global Information Technology Management*, vol. 16, no. 2, pp. 33-58.
Taylor, M.S., Grossman, G.M. & Helpman, E. 1993, 'Innovation and Growth in the Global Economy', *Economica*, vol. 60, no. 239, p. 373.
Tola, A. & Contini, M.V. 2015, 'From the Diffusion of Innovation to Tech Parks, Business Incubators as a Model of Economic Development: The Case of "Sardegna Ricerche"', *Procedia-Social and Behavioral Sciences*, vol. 176, pp. 494-503.
Tötterman, H. & Sten, J. 2005, 'Start-ups: Business incubation and social capital', *International small business journal*, vol. 23, no. 5, pp. 487-511.
Tsang, E.W. 2014, 'Case studies and generalization in information systems research: A critical realist perspective', *The Journal of Strategic Information Systems*, vol. 23, no. 2, pp. 174-86.

Tseng, F.-C. & Kuo, F.-Y. 2014, 'A study of social participation and knowledge sharing in the teachers' online professional community of practice', *Computers & Education*, vol. 72, pp. 37-47.
Udell, G.G. 1990, 'Academe and the goose that lays its golden egg', *Business Horizons*, vol. 33, no. 2, pp. 29-37.
Ullman, J.B. & Bentler, P.M. 2003, *Structural equation modeling*, Wiley Online Library.
Van den Hooff, B. & de Leeuw van Weenen, F. 2004, 'Committed to share: commitment and CMC use as antecedents of knowledge sharing', *Knowledge and process management*, vol. 11, no. 1, pp. 13-24.
Van Den Hooff, B. & De Ridder, J.A. 2004, 'Knowledge sharing in context: the influence of organizational commitment, communication climate and CMC use on knowledge sharing', *Journal of knowledge management*, vol. 8, no. 6, pp. 117-30.
Vanderstraeten, J. & Matthyssens, P. 2010, 'Measuring the performance of business incubators: A critical analysis of effectiveness approaches and performance measurement systems', *ICSB World Conference Proceedings*, International Council for Small Business (ICSB), p. 1.
Vision 2030 2018, *Vision 2030 of Saudi Arabia document*, viewed 25/08/2018 2018, <http://vision2030.gov.sa/en/foreword>.
Vogt, W.P. 2010, 'Quantitative research methods for professionals', *Boston, Massachusetts: Pearson Education*.
Von Krogh, G. 2002, 'The communal resource and information systems', *The Journal of Strategic Information Systems*, vol. 11, no. 2, pp. 85-107.
Wagner, K. 2005, 'Business development incubator programs: An assessment of performance in Missouri'.
Wang, S. & Noe, R.A. 2010, 'Knowledge sharing: A review and directions for future research', *Human resource management review*, vol. 20, no. 2, pp. 115-31.
Wang, S., Noe, R.A. & Wang, Z.-M. 2014, 'Motivating knowledge sharing in knowledge management systems: A quasi–field experiment', *Journal of Management*, vol. 40, no. 4, pp. 978-1009.
Wang, Z. & Wang, N. 2012, 'Knowledge sharing, innovation and firm performance', *Expert Systems with Applications*, vol. 39, no. 10, pp. 8899-908.
Wasko, M.M. & Faraj, S. 2005, 'Why should I share? Examining social capital and knowledge contribution in electronic networks of practice', *MIS quarterly*, pp. 35-57.
West, G.P. & Noel, T.W. 2009, 'The impact of knowledge resources on new venture performance', *Journal of Small Business Management*, vol. 47, no. 1, pp. 1-22.
Whitener, E.M. 2001, 'Do "high commitment" human resource practices affect employee commitment? A cross-level analysis using hierarchical linear modeling', *Journal of management*, vol. 27, no. 5, pp. 515-35.
Wiklund, J. & Shepherd, D. 2003, 'Knowledge‐based resources, entrepreneurial orientation, and the performance of small and medium‐sized businesses', *Strategic management journal*, vol. 24, no. 13, pp. 1307-14.
Williams, D. & Tsiteladze, D. 2016, 'Assessing the Value Added by Incubators for Innovative Small and Medium Enterprises in Russia', *TECHNOLOGY ENTREPRENEURSHIP AND BUSINESS INCUBATION: Theory• Practice• Lessons Learned*, World Scientific, pp. 151-78.

Willson, N. 2012, *What is a Startup Incubator?*, Quacquarelli Symonds Limited, viewed Sep 28 2015, <https://www.topmba.com/blog/what-startup-incubator%3E>.
Wiseman, D.G. & Hunt, G.H. 2013, *Best Practice in Motivation and Management in the Classroom*, Charles C Thomas Publisher.
Wójcik-Karpacz, A. & Mazurkiewicz, S. 2015, 'Practices of technology parks supporting innovative activities: Evidence from Poland', *Managing Global Transitions*, vol. 13, no. 4, p. 331.
Wolverton, M.L. 2009, 'Research Design, Hypothesis Testing, and Sampling', *Appraisal journal*, vol. 77, no. 4.
Wonglimpiyarat, J. 2014, *Technology Financing and Commercialization: Exploring the Challenges and how Nations Can Build Innovative Capacity*, Springer.
Wonglimpiyarat, J. 2016, 'The innovation incubator, university business incubator and technology transfer strategy: The case of Thailand', *Technology in Society*, vol. 46, pp. 18-27.
Woodman, R.W., Sawyer, J.E. & Griffin, R.W. 1993a, 'Toward a theory of organizational creativity', *Academy of management review*, vol. 18, no. 2, pp. 293-321.
Woodman, R.W., Sawyer, J.E. & Griffin, R.W. 1993b, 'Toward a Theory of Organizational Creativity', *The Academy of Management Review*, vol. 18, no. 2, p. 293.
Xiao, L. & North, D. 2017, 'The graduation performance of technology business incubators in China's three tier cities: the role of incubator funding, technical support, and entrepreneurial mentoring', *The Journal of Technology Transfer*, vol. 42, no. 3, pp. 615-34.
Yang, H.-L. & Wu, T.C. 2006, 'Knowledge sharing in an organization-Share or not?', *Computing & Informatics, 2006. ICOCI'06. International Conference on*, IEEE, pp. 1-7.
Yap, L., Tasmin, R., Rusuli, M.S.C. & Hashim, N. 2010, 'Factors influencing knowledge management practices among multimedia super corridor (MSC) organizations', *Communications of the IBIMA*.
Yee, N.G. 2009, 'Technology Incubator Performance in New Zealand', paper presented to the *2009 International Conference on Innovation Management*, 2009/12, <http://dx.doi.org/10.1109/icim.2009.44>.
Yeşil, S., Koska, A. & Büyükbeşe, T. 2013, 'Knowledge sharing process, innovation capability and innovation performance: an empirical study', *Procedia-Social and Behavioral Sciences*, vol. 75, pp. 217-25.
Yew Wong, K. 2005, 'Critical success factors for implementing knowledge management in small and medium enterprises', *Industrial Management & Data Systems*, vol. 105, no. 3, pp. 261-79.
Yin, R.K. 2009, 'How to do better case studies', *The SAGE handbook of applied social research methods*, vol. 2, pp. 254-82.
Yin, R.K. 2011, *Applications of case study research*, Sage.
Yin, R.K. 2013, 'Validity and generalization in future case study evaluations', *Evaluation*, vol. 19, no. 3, pp. 321-32.
Youtie, J. & Shapira, P. 2008, 'Building an innovation hub: A case study of the transformation of university roles in regional technological and economic development', *Research Policy*, vol. 37, no. 8, pp. 1188-204.

Yu, C., Yu, T.-F. & Yu, C.-C. 2013, 'Knowledge sharing, organizational climate, and innovative behavior: A cross-level analysis of effects', *Social Behavior and Personality: an international journal*, vol. 41, no. 1, pp. 143-56.
Yu, J. & Nijkamp, P. 2009, 'Methodological challenges and institutional barriers in the use of experimental method for the evaluation of business incubators: Lessons from the US, EU and China', *Science and Innovation Policy, 2009 Atlanta Conference on*, IEEE, pp. 1-9.
Zhang, H., Wu, W. & Zhao, L. 2016, 'A study of knowledge supernetworks and network robustness in different business incubators', *Physica A: Statistical Mechanics and its Applications*, vol. 447, pp. 545-60.
Zhang, X., Yu, P., Yan, J. & Spil, I.T.A. 2015, 'Using diffusion of innovation theory to understand the factors impacting patient acceptance and use of consumer e-health innovations: a case study in a primary care clinic', *BMC health services research*, vol. 15, no. 1, p. 71.
Zhu, X. 2014, 'Mandate versus championship: Vertical government intervention and diffusion of innovation in public services in authoritarian China', *Public Management Review*, vol. 16, no. 1, pp. 117-39.
Zibarzani, M. & Rozan, M.Z.A. 2017, 'The Role of Knowledge Sharing in Business Incubators Performance', *International Conference of Reliable Information and Communication Technology*, Springer, pp. 719-27.
Zmigrod, S., Zmigrod, L. & Hommel, B. 2015, 'Zooming into creativity: individual differences in attentional global-local biases are linked to creative thinking', *Frontiers in psychology*, vol. 6.

APPENDIX A: Measurement Instrument

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SURVEY

Factors Contributing to Visible Performance in Saudi Technology Incubators

Dear Participant,
My name is Muhammad Binsawad and I'm a PhD student at University of Technology Sydney UTS. This study is being conducted as a part for my research degree. The purpose of the study is to learn the influence of creativity, knowledge sharing, and diffusion of innovation towards technology business incubators performance in Saudi Arabia. Participation in this research study is completely voluntary. You have the right to withdraw at any time or refuse to participate entirely. The results from this project will help us identify the various factors of technology business incubators performance in Saudi Arabia. **This survey should take no more than 12 minutes**. If you agree to be part of the research and research data gathered from this survey to be published in a form that does not identify you, please continue with answering the survey questions

If you have concerns about the research that you think I, Muhammad, or my supervisor, Igor, can help you with, please feel free to contact (us) on mobile number [redacted] or Email at [redacted] and Igor.Hawryszkiewycz@uts.edu.au

If you would like to talk to someone who is not connected with the research, you may contact the Research Ethics Officer on 02 9514 9772, and quote this number (UTS HREC Approval Number: ETH16-0548)

Personal Information										
1	Gender	○ Male				○ Female				
2	What is your age group?	○ 18-25		○ 26-35		○ 36-45		○ 46 and above		
3	Current level of education.	○ Doctorate Degree		○ Master's Degree		○ Bachelor's Degree		○ Diploma		Other
4	Citizen	○ Saudi		○ Non Saudi				○ Non Saudi Born in Saudi		
5	Experience	○ 1 Year		○ 2-3 Year		○ 4-5 Year		○ More than 5 Years		
6	Job Role	.....								

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Knowledge Sharing Organizational Factors						
Management Support (MS)		**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	The top management provides with necessary resources and environment for motivating employees.	○	○	○	○	○
2	Motivation by top management has a bigger role in knowledge sharing within the technology business incubator.	○	○	○	○	○
3	The top management of technology business incubator keeps a two-way communication system always open for encouraging weak performers.	○	○	○	○	○
4	The top management of technology business incubator takes motivational initiatives, such as appreciation of good performance and knowledge sharing activities.	○	○	○	○	○
IT Support (ITS)		**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	The technology business incubator facilitates me with appropriate technical tools required for knowledge sharing.	○	○	○	○	○
2	My co-workers utilize electronic data management system for accessing and storing the recent information.	○	○	○	○	○
3	The advanced technological tools that are available in technology business incubator promote knowledge sharing	○	○	○	○	○
Reward (RWD)		**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	The top management financially rewards the employees for knowledge sharing initiatives in technology business incubator.	○	○	○	○	○
2	Rewards for knowledge sharing contribute to motivating the employees.	○	○	○	○	○
3	The top management adopts non-monetary measures for rewarding the employees that share their experiences and knowledge.	○	○	○	○	○

Knowledge Sharing Individuals Factors						
Self-Efficacy (OIC)		**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	My individual performance represents the level of self-efficacy.	○	○	○	○	○

2	My focus on the development of skills has a direct impact on my level of self-efficacy	○	○	○	○	○
3	Self-efficacy plays an important role in efficient sharing of knowledge.	○	○	○	○	○

Interpersonal Trust (IPT)		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I don't hesitate to share my feelings and point of views with my colleagues at the workplace	○	○	○	○	○
2	I believe that staff should not share personal information at the workplace.	○	○	○	○	○
3	In our Incubator a considerable level of trust exists among colleagues.	○	○	○	○	○
4	Most of my colleagues are people whom I know and thus, consider them trustworthy	○	○	○	○	○
Enjoyment in Sharing (ENS)		**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	My colleagues love sharing their knowledge with other workers.	○	○	○	○	○
2	I enjoy helping colleagues by sharing my knowledge	○	○	○	○	○
3	Sharing my knowledge with colleagues is pleasurable	○	○	○	○	○

Knowledge Sharing Process (KSP)						
(Donation and Collection)		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I often share with my colleagues me knowledge, working skills and information that I learn	○	○	○	○	○
2	My colleagues often share with me knowledge, working skills and information that they learn	○	○	○	○	○
3	Knowledge sharing among colleagues is considered normal in my incubator	○	○	○	○	○
4	I share me knowledge, working skills and information I have with colleagues when they ask for it	○	○	○	○	○
5	My colleagues usually share with me me knowledge, working skills and information they know when ask them	○	○	○	○	○

6	Knowledge exchange is considered as normal and appreciable practice in the incubator.	○	○	○	○	○

Diffusion of Innovation (DOI)						
Complexity (ComX)		**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	Complexity feature of innovation hinders the diffusion of technology in the technology business incubator.	○	○	○	○	○
2	The sharing of ideas and mutual discussions can reduce the complexity of innovation diffusion in the technology business incubator	○	○	○	○	○
3	In the technology business incubator, innovation complexities are resolved by educating employees about the foundation of developed innovation.	○	○	○	○	○
Compatibility (ComB)		**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	Compatibility of innovation is aligned with the current values and practices of the technology business incubator are necessary.	○	○	○	○	○
2	Our innovation is compatible with our social values.	○	○	○	○	○
3	Innovations do not contradict incubator's policy or situation	○	○	○	○	○
Relative Advantage (RelA)		**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	My co-workers perceive innovation as advantageous.	○	○	○	○	○
2	Relative advantage of innovation plays a crucial role in persuading people for innovation adoption.	○	○	○	○	○
3	Our innovation largely determines the specific type of relative advantage (such as economic, social.	○	○	○	○	○

Creativity						
Intrinsic Motivation (IMoT)		**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	We have a useful of resources to work effectively.	○	○	○	○	○
2	I am affected by the work environment to be engaged in the creative process.	○	○	○	○	○

3	I enjoy challenging in my work.	○	○	○	○	○

Expertise (Exp)		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I know what our organisation wants to achieve	○	○	○	○	○
2	I have the acquired expertise in particular field.	○	○	○	○	○
3	I can solve complex problems	○	○	○	○	○
Creative Thinking Skills (CTS)		**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	I am good at generating novel ideas	○	○	○	○	○
2	I have the acquired training for idea generation	○	○	○	○	○
3	Brainstorming sessions help me to connect ideas generation into solution.	○	○	○	○	○

Incubator Performance (IP)						
Please assess Incubator firm performance compared to other firms facing similar development challenges or that are in the same business on a scale ranging from 'very low performer' (1) to 'very high performer' (5), in the following areas:		Very Low	Low	Natural	High	Very High
1	Program profile (growth in budget, space, facilities, services, tenants and staff)	○	○	○	○	○
2	Presence of a complementing research park facility.	○	○	○	○	○
3	Level of funding received from key donors including state, industry, university	○	○	○	○	○
4	Tenant firms' survivability (ratio of survivors to discontinuances).	○	○	○	○	○
5	Tenant firms' employment growth (% annual growth during incubation)	○	○	○	○	○
6	Impact on university's teaching and research	○	○	○	○	○
7	Students/graduates hired by tenants as employees.	○	○	○	○	○
8	Consulting relationships between university faculty and tenants.	○	○	○	○	○

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9	Tenants' and graduate's employment (number, nature).	○	○	○	○	○

Any Suggestions about the factors effecting technology business incubator performance in Saudi Arabia? For example, what are the factors you think is important related to this research ?
.....

Thank You for Your Time

Note: *This information is confidential. Kindly, do not use it before obtaining the approval as this data owned by researcher only*

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استطلاع رأي

العوامل المساهمة في الأداء النسبي لحاضنات الأعمال التقنية في المملكة العربية السعودية

عزيزي المشارك،

اسمي محمد حاتم بن سواد، أحد طلاب جامعة سيدني للتقنية. تجرى هذه الدراسة كجزء من الدرجة البحثية. تهدف الدراسة للتعرف على تأثير الإبداع والمعرفة ونشر الابتكار تجاه أداء حاضنات الاعمال التقنية في المملكة العربية السعودية. سوف تساعدنا أيضا نتائج هذا المشروع البحثي في التعرف على العوامل الفنية والفردية والمؤسسية المؤثرة على مشاركة المعرفة في حاضنات الاعمال التقنية في المملكة العربية السعودية وإقرار النموذج التصوري بناء على العوامل المحددة والتي تؤثر على مشاركة المعرفة في مجتمع الحاضنات. المشاركة في هذا البحث تطوعية بشكل كامل، كما أن لك الحق في الانسحاب في أي وقت أو رفض المشاركة بالكامل. لا يزيد وقت الاستبيان على ١٢ دقيقة. إذا وافقت على المشاركة في هذا البحث ونشر البيانات التي يتم جمعها من الاستبيان بحيث لا تشير إلى شخصكم، نرجو الاستمرار والاجابة على أسئلة الاستبيان كاملة.

إذا كان لديك أي مخاوف بخصوص البحث وتعتقد أني أو المشرف يمكنه مساعدتك نرجو عدم التردد في الاتصال بنا على رقم الجوال: [redacted] أو البريد الالكتروني ([redacted]) وعضو هيئة التدريس د. عبدالله الغامدي بجامعة الملك عبدالعزيز، جده، المملكة العربية السعودية، على البريد الالكتروني: (aalmalaise@kau.edu.sa)

إذا أردت التحدث إلى شخص غير مرتبط بالبحث يمكنك الاتصال بمسئول أخلاقيات البحث العلمي على رقم 0295149772، وذكر رقم اعتماد الجامعة للبحث: 2014000570

المعلومات الشخصية						
1	الجنس	ذكر ○		أنثى ○		
2	ما هي الفئة العمرية؟	25-18 ○	35-26 ○	45-36 ○	46 وأكبر ○	
3	مستوى التعليم الحالي	دكتوراه ○	ماجستير ○	بكالوريوس ○	دبلوم ○	أخر ○
4	الجنسية	سعودي ○	غير سعودي ○	غير سعودي مولود في السعودية ○		
5	الخبرة	1 عام ○	3-2 أعوام ○	5-4 أعوام ○	أكثر من 5 أعوام ○	
6	الوظيفة	.....				

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العوامل التنظيمية لمشاركة المعلومات						
مؤيد بشدة	مؤيد	محايد	معارض	معارض بشدة	دعم الإدارة	
○	○	○	○	○	توفر الإدارة العليا الموارد والبيئة اللازمتين لتحفيز الموظفين	1
○	○	○	○	○	أرى أن التحفيز من قبل الإدارة العليا له دور كبير في مشاركة المعرفة في حاضنة الأعمال التقنية	2
○	○	○	○	○	دائمًا ما تترك الإدارة العليا لحاضنة الأعمال التقنية نظامي اتصال مفتوحين لتشجيع المؤدين الضعفاء	3
○	○	○	○	○	تشرع الإدارة العليا لحاضنة الأعمال التقنية بمبادرات تحفيزية مثل تقدير الأداء الجيد وأنشطة مشاركة المعرفة	4
مؤيد بشدة	مؤيد	محايد	معارض	معارض بشدة	دعم تقنية المعلومات	
○	○	○	○	○	توفر لي حاضنة الأعمال التقنية الأدوات التقنية المناسبة المطلوبة لمشاركة المعرفة	1
○	○	○	○	○	يستخدم زملائي في العمل النظام الإلكتروني لإدارة البيانات للدخول وتخزين البيانات الأخيرة	2
○	○	○	○	○	الأدوات التقنية المتقدمة المتوفرة في حاضنة الأعمال التقنية تعزز من مشاركة المعرفة	3
مؤيد بشدة	مؤيد	محايد	معارض	معارض بشدة	المكافأة	
○	○	○	○	○	تكافئ الإدارة العليا الموظفين بشكل مادي عن مبادرات مشاركة المعرفة في حاضنة الأعمال التقنية	1
○	○	○	○	○	المكافآت عن مشاركة المعرفة تساهم في تحفيز الموظفين	2
○	○	○	○	○	تتبنى الإدارة العليا تدابير غير إلزامية لمكافأة الموظفين الذين يشاركون خبراتهم ومعرفتهم	3

العوامل الفردية لمشاركة المعلومات						
مؤيد بشدة	مؤيد	محايد	معارض	معارض بشدة	الفعالية الذاتية	
○	○	○	○	○	أدائي الفردي يمثل مستوى الفعالية الذاتية	1
○	○	○	○	○	تركيزي على تنمية المهارات له تأثير مباشر على مستوى الفعالية الذاتية	2
○	○	○	○	○	الفعالية الذاتية تلعب دورًا مهمًا في المشاركة الفاعلة للمعرفة	3

	الثقة الشخصية	معارض بشدة	معارض	محايد	مؤيد	مؤيد بشدة
1	لا أتردد في مشاركة مشاعري وأرائي حول زملائي في العمل	○	○	○	○	○
2	أرى أن طاقم العمل يجب ألا يشارك المعلومات الشخصية في العمل	○	○	○	○	○
3	في الحاضنة الخاصة بنا يوجد مستوى كبير من الثقة بين الزملاء	○	○	○	○	○
4	معظم زملائي أناس أعرفهم، ولذا اعتبرهم محل ثقة	○	○	○	○	○
	الاستمتاع بالمشاركة	**معارض بشدة**	**معارض**	**محايد**	**مؤيد**	**مؤيد بشدة**
1	يحب زملائي مشاركة المعرفة لديهم مع العاملين الآخرين	○	○	○	○	○
2	استمتع بمساعدة زملائي بواسطة مشاركة المعرفة لدي	○	○	○	○	○
3	مشاركة معرفتي مع زملائي أمر سار	○	○	○	○	○

عملية مشاركة المعرفة						
	(التبرع والجمع)	**معارض بشدة**	**معارض**	**محايد**	**مؤيد**	**مؤيد بشدة**
1	غالبًا ما أشارك المهارات الجديدة التي أتعلمها مع زملائي	○	○	○	○	○
2	زملائي في الحاضنة دائما يشاركون مع المهارات والمعلومات التي تعلموها	○	○	○	○	○
3	مشاركة المعرفة مع الزملاء يعتبر أمر طبيعي في شركتي	○	○	○	○	○
4	أشارك المعلومات والمهارات مع زملائي عندما يسألون عنها	○	○	○	○	○
5	زملائي في الحاضنة يشاركون المهارات والمعلومات التي يعرونها دون الحاجة لسؤالهم لها	○	○	○	○	○
6	تعتبر مشاركة المعلومات المفيدة ممارسة طبيعية وقيمة في حاضنة الأعمال التقنية	○	○	○	○	○

نشر الابتكار						
	التعقيد	**معارض بشدة**	**معارض**	**محايد**	**مؤيد**	**مؤيد بشدة**
1	تعقيد خاصية الابتكار تعقد نشر التقنية في حاضنة الأعمال التقنية.	○	○	○	○	○
2	مشاركة الأفكار والنقاشات المشتركة يمكن أن تقلل من تعقيد نشر الابتكار في حاضنة الأعمال التقنية.	○	○	○	○	○
3	في حاضنة الأعمال التقنية، تحل تعقيدات الابتكار	○	○	○	○	○

	بواسطة تعريف الموظفين بأساس الابتكار المطور.					
التوافق		**معارض بشدة**	**معارض**	**محايد**	**مؤيد**	**مؤيد بشدة**
1	أعتقد أن توافق الابتكار مع القيم والممارسات الحالية لحاضنة الأعمال التقنية ضروري.	○	○	○	○	○
2	يتوافق ابتكارنا مع قيمنا الاجتماعية	○	○	○	○	○
3	الابتكارات لا تتعارض مع سياسات الحاضنة	○	○	○	○	○
المزايا ذات الصلة		**معارض بشدة**	**معارض**	**محايد**	**مؤيد**	**مؤيد بشدة**
1	يدرك زملائي في العمل الابتكار على أنه أمر مميز	○	○	○	○	○
2	مزايا الابتكار ذات الصلة تلعب دور حاسم في إقناع الناس بتبني الابتكار	○	○	○	○	○
3	يحدد ابتكارنا نوع محدد من المزايا ذات الصلة على نحو كبير (مثل المزايا الاقتصادية والاجتماعية)	○	○	○	○	○

الإبداع						
التحفيز الجوهري		**معارض بشدة**	**معارض**	**محايد**	**مؤيد**	**مؤيد بشدة**
1	لدينا موارد مفيدة للعمل بفاعلية	○	○	○	○	○
2	اتأثر ببيئة العمل وتحفزني إلى الإبداع	○	○	○	○	○
3	استمتع بالتحديات في العمل	○	○	○	○	○
الخبرة		**معارض بشدة**	**معارض**	**محايد**	**مؤيد**	**مؤيد بشدة**
1	أنا أدرك ما ترغب الحاضنة في تحقيقه	○	○	○	○	○
2	لدي الخبرة المطلوبة في مجال معين	○	○	○	○	○
3	أستطيع حل المشكلات المعقدة	○	○	○	○	○
مهارات التفكير المبدع		**معارض بشدة**	**معارض**	**محايد**	**مؤيد**	**مؤيد بشدة**
1	أنا جيد في انتاج الأفكار الجديدة	○	○	○	○	○
2	لدي التدريب المطلوب لتوليد الفكرة	○	○	○	○	○
3	تساعدني جلسات العصف الذهني في ربط توليد الأفكار مع الحلول.	○	○	○	○	○

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أداء الحاضنة						
	الرجاء تقييم أداء الشركة الحاضنة مقارنة بالشركات الأخرى التي تواجه تنمية المهارات نفسها أو في العمل نفسه بمقياس من "مؤدي منخفض جدًا" (1) إلى "مؤدي مرتفع جدًا" (5) في النقاط التالية:	منخفض جدًا	منخفض	متعادل	مرتفع	مرتفع جدًا
1	ملف البرنامج (النمو في الميزانية والمساحة والمرافق والخدمات والمستأجرين وطاقم العمل)	○	○	○	○	○
2	وجود مرفق البحث التكميلي	○	○	○	○	○
3	مستوى التمويل المستلم من المانحين الرئيسين شامل الحكومة والصناعة والجامعة	○	○	○	○	○
4	استمرارية الشركات المستأجرة (معدل المستمرين للمتوقفين)	○	○	○	○	○
5	نمو العمالة للشركات المستأجرة (% النمو السنوي خلال الحاضنة)	○	○	○	○	○
6	التأثير على التدريس والبحث في الجامعة.	○	○	○	○	○
7	الطلاب/ الخريجون المعينون من قبل الشركات المستأجرة كموظفين.	○	○	○	○	○
8	علاقات الاستشارة بين طاقم التدريس في الجامعة والشركات المستأجرة.	○	○	○	○	○
9	الشركات المستأجرة وتوظيف الخريجين (العدد والطبيعة)	○	○	○	○	○

هل لديك أي اقتراحات بخصوص تأثير الإبداع والمعرفة ونشر الابتكار تجاه أداء حاضنات الاعمال التقنية في المملكة العربية السعودية ؟ على سبيل المثال، ما هي العوامل الأخرى التي تعتقد أنها مهمة ومرتبطة بالموضوع؟

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نشكركم على وقتكم الثمين

ملاحظة: هذه المعلومات سرية فنرجو عدم استخدامها قبل الحصول على موافقة الباحث حيث أنه المالك الوحيد لهذه البيانات.

APPENDIX B: Interview Questions

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Muhammad Binsawad Ethics Application Reference number ETH16-0548

Explanations of Any Technical Terms Used

1) Knowledge Sharing Process (Donating and Collecting)

Knowledge donating is defined as "the process of individuals communicating their personal intellectual capital to others" while

Knowledge collecting is defined as the "process of consulting colleagues to encourage them to share their intellectual capital."

2) Knowledge sharing individual factors

Self-efficacy is defined as the "judgments of individuals regarding their capabilities to organize and execute courses of action required to achieve specific levels of performance."

Trust: refers to "co-workers having a good level of faith in each other in terms of intentions and behaviours."

Enjoyment in sharing: refers to pleasure and joy in exchange of information among people

3) Knowledge sharing organizational factors

Management Support: "The degree to which the top management support the organizational climate of knowledge-sharing by providing sufficient resources and influencing the employee willingness to share knowledge"

Rewards: refers to "the degree to which a reward system to share any new and creative ideas and effectiveness knowledge-sharing."

IT support: refers to the "level to which facilitating knowledge-sharing through information technology use."

4) Creativity

Creative-thinking skills: refers to the abilities or capabilities for innovative, cognitive and creative thoughts.

Intrinsic Motivation: refers to the passion and desire of someone to work on a specific task that is interesting, challenging and exciting for him

Expertise: Expertise can be considered as skills of performing a specific task in the most effective and creative manner.

5) Diffusion of Innovation

Relative advantage: refers to the potential advantage that could be achieved by users, if the innovation was applied

Compatibility: It's about the extent to which innovation is considered as stable with current values.

Complexity: This is how could the new idea or practice could be adopted easily that could be involved in the ability of users, technical skills conditions and technological requirements, etc.

6) Incubator Performance: performance outcomes is considered as following: -

- Program growth and sustainability (such as, growth in budget, space, facilities, services, tenants and staff)
- Tenant firm's survival and growth (such as, sales growth, employment growth)
- Contributions to sponsoring university's mission
- Community-related impacts (such as, sales, revenues, taxes, exp, and graduate's employment etc.)

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Interview Questions

Can you please tell me more about job discerptions? How long have you been working in this position?
How would you describe the incubator's facilities?

1- Knowledge Sharing Process

- What about the communication? Do you feel an open collaboration atmosphere?
- Is it easy to communicate with people in different department, do you have to go through some sort of channels?
- What kind of information do the incubatee (people) share here?
- Do you consider knowledge sharing as a normal practice in the incubator (How)?
- How do you see the impact of knowledge sharing process in your incubator in relation to the incubator's performance?

2- Knowledge Sharing Organizational Factors

- Which techniques do you use to facilitate knowledge sharing process in your incubator? (IT)
- How do you see the impact of information technology support in your incubator incubator in relation to knowledge sharing process?
- How do you support incubatee participating in knowledge sharing practices? (MS)
- How do you see the impact of management support in your incubator in relation to knowledge sharing process?
- When your incubatee are engaged in knowledge sharing practice, do you motivate them by rewarding them? (Reward)
- How do you see the impact of motivational rewards in your incubator in relation to knowledge sharing process?

3- Knowledge Sharing Individuals Factors

- Do you think self-efficacy can play a significant role ins knowledge sharing process between incubatee?
- How do you see the impact of self-efficacy in your incubator in relation to knowledge sharing process? (SE)
- Do you think interpersonal trust has an impact in your incubator in relation to knowledge sharing process? (IPT)
- How do you see the impact of interpersonal trust on knowledge sharing process in your incubator?
- Do you feel that sharing knowledge between incubatee is pleasurable? (ENS)
- How do you see the impact of enjoyment in sharing knowledge in your incubator in relation to knowledge sharing process?

4- Individual Creativity

- What sources/techniques stimulate individual creativity in your incubator, such as intrinsic motivation, expertise and creative thinking skills?
- How can creativity be enhanced in the incubator?
- How do you see the impact of individual creativity in your incubator in relation to incubator's performance?

5- Diffusion of Innovation

- How do you think innovations can offer greater value?
- How do you see the impact of relative advantage in your incubator in relation to the incubator's performance?
- Do you think compatibility of innovations is a key role in enhancing the incubator's performance? (How?)
- Do you think the complexity of innovations can be a value added?
- How do you see the impact of the complexity of innovations in your incubator in relation to the incubator's performance?

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6- Technology Business Incubator Performance

- What are some of the key performance indicator (KPI) of your Incubator?
- What is the contribution of your incubator goals to the society?
- Do you think theses factors knowledge sharing process, individual creativity and diffusion of innovation are related to the incubator's performance? (How?)

Other

Based on your experience, what you think the most important factors effecting the Incubator performance?

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اسئلة المقابلة

* هل يمكن أن تخبرني أكثر عن طبيعة عملك؟ منذ متى؟
* كيف تصف مزايا الحاضنة؟

١-عملية مشاركة المعرفة

* ماذا عن التواصل؟ هل تشعر جو تعاون مفتوح؟

هل من السهل التواصل مع الناس في مختلف الإدارات، هل لديك للذهاب من خلال نوع من القنوات؟

* أي نوع من المعلومات يقوم اصحاب المشاريع المحتضنة بمشاركتها هنا؟
* هل تعتبر مشاركة المعرفة ممارسة طبيعية في الحاضنة (كيف)؟
* كيف ترى تأثير عملية مشاركة المعرفة على أداء الحاضنة؟

٢- العوامل التنظيمية المؤثرة على مشاركة المعرفة

* ما هي التقنيات التي تستخدمها لتسهيل عملية مشاركة المعرفة في الحاضنة؟
* كيف ترى تأثير دعم تكنولوجيا المعلومات على مشاركة المعرفة في الحاضنة؟
* كيف يمكنك تشجيع اصحاب المشاريع المحتضنة لعملية مشاركة المعرفة؟
* كيف ترى تأثير ادارة الحاضنة على عملية مشاركة المعرفة في الحاضنة؟
* عندما تشارك حاضنة الخاص بك في عملية مشاركة المعرفة، هل يتم تحفيزهم من خلال مكافأة لهم (جائزة او مكافأه)؟
* كيف ترى تأثير المكافآت التحفيزية على عملية مشاركة المعرفة في الحاضنة؟

٣- العوامل التنظيمية المؤثرة على مشاركة المعرفة

* هل تعتقد أن الكفاءة الذاتية قد تلعب دورا هاما في عملية مشاركة المعرفة في الحاضنة؟
* كيف ترى تأثير الكفاءة الذاتية على عملية مشاركة المعرفة في الحاضنة؟
* كيف ترى تأثير هل تعتقد أن الثقة بين الأشخاص لها تأثير على عملية مشاركة المعرفة في الحاضنة؟
* الثقة بين الأشخاص على عملية مشاركة المعرفة في الحاضنة؟
* هل تشعر أن عملية مشاركة المعرفة في الحاضنة هي شيء ممتع؟
* كيف ترى تأثير عامل الإستمتاع بالمشاركة للمعرفة على عملية مشاركة المعرفة في الحاضنة؟

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٤- الإبداع الفردي

* ما هي المصادر / التقنيات التي تحفز الإبداع الفردي في حاضنتك، مثل الدافع الذاتي والخبرة ومهارات التفكير الإبداعي؟
* كيف يمكن تعزيز الإبداع في الحاضنة؟
* كيف ترى تأثير الإبداع الفردي على أداء الحاضنة؟

٥- نشر الابتكار

*كيف تعتقد أن الابتكارات يمكن أن تقدم قيمة أكبر؟
* كيف ترى تأثير الميزة النسبية في أداء الحاضنة؟
*هل تعتقد أن توافق الابتكارات هو دور أساسي في تعزيز أداء الحاضنة؟ (ماذا؟)
*هل تعتقد أن تعقيد الابتكارات يمكن أن يكون قيمة مضافة؟
* كيف ترى تأثير الابتكارات المعقدة في أداء الحاضنة؟

٦- أداء حاضنة الأعمال التقنية

* ما هي بعض مؤشرات الأداء الرئيسية للحاضنة؟
* ما هي مساهمة أهداف الحاضنة للمجتمع؟
* هل تعتقد أن هذه العوامل (عملية مشاركة المعرفة والإبداع الفردي ونشر الابتكار) ترتبط بأداء الحاضنة؟ (كيف؟)

آخرى

* بناء على خبرتك، ما هي أهم العوامل التي تؤثر على أداء الحاضنة؟

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جمع البيانات البحثية لدرجة الدكتوراه

طالب الدكتوراه بجامعة سدني للتكنولوجيا UTS: محمد حاتم بن سواد

رقم مرجع لجنة قيم وأخلاقيات البحث بجامعة سدني للتكنولوجيا بأستراليا

ETH16-0548

مقابلة لجمع بيانات نوعية

عنوان المشروع البحثي: العوامل المساهمة في الأداء النسبي لحاضنات الأعمال التقنية في المملكة العربية السعودية

شرح المصطلحات الفنية المستخدمة

١- عملية مشاركة المعرفة (التبرع والتحصيل)

تعرف المعرفة التي تتبرع بها بأنها عملية التواصل بين الأفراد رأس المال الفكري الشخصي للآخرين

في حين

ويعرف جمع المعرفة بأنه عملية استشارة الزملاء لتشجيعهم على تقاسم رؤوس أموالهم الفكرية

٢- العوامل الفردية المؤثرة على عملية مشاركة المعرفة

الكفاءة الذاتية: وتعرف بأنها "أحكام الأفراد فيما يتعلق بقدراتهم على تنظيم وتنفيذ مسارات العمل اللازمة لتحقيق مستويات محددة من الأداء.

الثقة: يشير إلى زملاء العمل لديهم مستوى جيد من الإيمان في بعضهم البعض من حيث النوايا والسلوكيات

التمتع عملية مشاركة المعرفة: يشير إلى المتعة والفرح في تبادل المعلومات بين الناس

٣- العوامل التنظيمية المؤثرة على عملية مشاركة المعرفة

دعم الإدارة: "درجة دعم الإدارة العليا للمناخ التنظيمي لعملية مشاركة المعرفة من خلال توفير الموارد الكافية والتأثير على رغبة الموظف في تبادل المعرفة

المكافآت: تشير إلى درجة نظام المكافأة لتبادل الأفكار الجديدة والإبداعية وفعالية تبادل المعرفة

دعم تكنولوجيا المعلومات: تشير إلى المستوى الذي يسهل عملية مشاركة المعرفة من خلال استخدام تكنولوجيا المعلومات

٤- الإبداع

.مهارات التفكير الإبداعي: قدرات الأفكار المبتكرة أو القدرات المعرفية والإبداعية
الدافع الذاتي: يشير إلى العاطفة والرغبة من شخص ما للعمل على مهمة محددة مثيرة للاهتمام، مما يشكل تحديا ومثيرة بالنسبة له
الخبرة: يمكن اعتبار الخبرة كمهارات لأداء مهمة محددة بأكثر الطرق فعالية وإبداعا

٥- نشر الابتكار

الميزة النسبية: تشير إلى الميزة المحتملة التي يمكن أن يتحقق من قبل المستخدمين، إذا تم تطبيق الابتكار
.التوافق: يتعلق الأمر بمدى اعتبار الابتكار مستقرا مع القيم الحالية
التعقيد: هذه هي الطريقة التي يمكن بها اعتماد الفكرة أو الممارسة الجديدة بسهولة
يمكن أن تشارك في قدرة المستخدمين، وظروف المهارات التقنية والمتطلبات التكنولوجية، وما إلى ذلك

٦- أداء حاضنة: يقاس الأداء للحاضنة على النحو التالي: -

- نمو البرامج واستدامتها (مثل النمو في الميزانية والفضاء والمرافق والخدمات والمستأجرين والموظفين)

- بقاء الشركة ونموها (مثل نمو المبيعات ونمو العمالة)

- المساهمات في رعاية مهمة الجامعة

- التأثيرات المرتبطة بالمجتمع (مثل المبيعات والإيرادات والضرائب والتوقعات والدراسات العليا)

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Interviews CONSENT FORM

I _____ (Participant's name) agree to participate in the research project **"Factors Contributing to Visible Performance in Saudi Technology Incubators"** being conducted by Muhammad Binsawad (Faculty of Engineering & IT, contact +61 [redacted] or [redacted]) of the University of Technology, Sydney for his degree (Doctor of Philosophy in Information Systems).

I understand that the purpose of the study is to investigate the influence of creativity, knowledge sharing, and diffusion of innovation towards technology incubators performance in Saudi Arabia. I understand that I have been asked to participate in this research because I have been involved in technology incubators in Saudi Arabia. I understand that the interview process can take up to 30 minutes and my answers will be recorded. I understand that there is no risk associated with my participation this research.

I am aware that I can contact Muhammad Binsawad [redacted] or his supervisor Professor Igor Hawryszkiewycz Igor.Hawryszkiewycz@uts.edu.au if I have any concerns about the research. I understand that participation in this research study is completely voluntary and that I have the right to withdraw at any time or refuse to participate entirely.

I agree that Muhammad Binsawad has answered all my questions fully and clearly. I agree that the research data gathered from this project may be published in a form that does not identify me in any way.

_____ ____/____/____
Signature (participant)

_____ ____/____/____
Signature (researcher or delegate)

NOTE:
This study has been approved by the University of Technology, Sydney Human Research Ethics Committee. If you have any complaints or reservations about any aspect of your participation in this research which you cannot resolve with the researcher, you may contact the Ethics Committee through the Research Ethics Officer (ph: +61 2 9514 9772 Research.Ethics@uts.edu.au and quote the UTS HREC reference number [add number]. Any complaint you make will be treated in confidence and investigated fully and you will be informed of the outcome.

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نموذج موافقة

أوافق أنا _____ (اسم المشارك) على المشاركة في مشروع البحث (العوامل المساهمة في الأداء النسبي لحاضنات الأعمال التقنية في المملكة العربية السعودية) (مرجع الاعتماد: TH16-0548) والمعد لحصول الباحث على درجة الدكتوراه. ، والذي يقوم به الباحث: محمد حاتم بن سواد بجامعة سيدني للتقنية \ ص ب: 123، برودواي، نيو ساوث ويلز، 2007، هاتف رقم: 966555122690+، أو 61421339759+

أتفهم أن الغرض من هذه الدراسة هو التعرف على تأثير الإبداع ومشاركة المعرفة ونشر الابتكار في أداء الحاضنات التقنية في المملكة العربية السعودية.

أتفهم أيضا سبب طلب المشاركة في هذا البحث وهو كوني أشغل احد الوظائف المهمة في الحاضنة التقنية كما أن لدي معرفة في هذا مجال عملي وأعرف أن مشاركتي في البحث تتضمن عمل مقابلة مدتها ٣٠ دقيقة بهدف التعرف على العوامل التي تؤثر أداء الحاضنات التقنية في المملكة العربية السعودية. من الممكن أيضا أن أشعر ببعض الازعاج البسيط حيث أن مدة المقابلة ٣٠-٤٥ دقيقة وسوف يتم تسجيلها. وقد أذنت للباحث قبل المقابلة بعمل المقابلة وتسجيلها.

أعي تماما بأنني أستطيع الاتصال بالباحث/ محمد بن سواد أو مشرف البحث/ البروفيسور إيغور زتيويكزيروه إذا كان لدي أي مخاوف بخصوص البحث. أفهم أيضا أن لي الحرية في الانسحاب من المشاركة في المشروع البحثي في أي وقت دون ذكر سبب أو أي نتيجة تترب على ذلك.

أقر بأن الباحث محمد بن سواد قد أجاب على جميع أسئلتي بوضوح تام.

أوافق على أن نشر البيانات البحثية التي جمعت في هذا المشروع والتي لا تشير إلى شخصيتي بأي شكل.

التوقيع: (المشارك) التاريخ:

التوقيع: (الباحث أو من ينوب عنه) التاريخ:

إذا كان لديك أي مخاوف بخصوص البحث وتعتقد أني أو المشرف يمكنه مساعدتك نرجو عدم التردد في الاتصال بنا على رقم الجوال: 966555122690+ أو البريد الالكتروني ([redacted]) وعضو هيئة التدريس د. عبدالله الغامدي بجامعة الملك عبدالعزيز، جده ، المملكة العربية السعودية، على البريد الالكتروني: (aalmalaise@kau.edu.sa)

ملاحظة:

تم اعتماد هذه الدراسة من جامعة سيدني للتقنية من لجنة أخلاقيات البحث البشري. إذا كان لديك أي شكاوى أو تحفظات على أي جانب من جوانب المشاركة يمكنك الاتصال بمسئول أخلاقيات البحث هاتف: 61295149772+ (بريد الكتروني: Research.Ethics@uts.edu.au) وذكر مرجع الاعتماد من الجامعة وسوف يتم إخطاركم بالنتيجة.

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INFORMATION SHEET

Factors Contributing to Visible Performance in Saudi Technology Incubators

WHO IS DOING THE RESEARCH?

My name is Muhammad Hatim Binsawad. I'm a PhD candidate at Faculty of Engineering & IT at the University of Technology, Sydney. My supervisor is Professor Igor Hawryszkiewycz.

WHAT IS THIS RESEARCH ABOUT?

This research is being conducted to find out how creativity, knowledge-sharing and the diffusion of innovation influence the performance of technology business incubators in Saudi Arabia.

IF I SAY YES, WHAT WILL IT INVOLVE?

I will ask you to fill out a questionnaire. This should take between 10 and 15 minutes.

ARE THERE ANY RISKS/INCONVENIENCE?

This research involves no risk or inconvenience associated with your participation apart from taking up 10 to 15 minutes of your time.

WHY HAVE I BEEN ASKED?

You have been asked to participate in this research because of your key position at a firm that is considered a technology business incubator.

DO I HAVE TO SAY YES?

You have the full right to decide wether you want to be part of this study or not. If you want to be part of this study, you will be given this Participant Information Sheet and Consent Form to sign and you will also be given a copy to keep. Also, you can change your mind and then withdraw from the study will not affect your family's routine treatment or future health care.

WHAT WILL HAPPEN IF I SAY NO?

Nothing. I will thank you for your time so far and I will not contact you about this research again.

IF I SAY YES, CAN I CHANGE MY MIND LATER?

You have the right to withdraw at any time or refuse to participate entirely. If this occurs, I will thank you for your time so far and will not contact you about this research again.

WHAT IF I HAVE CONCERNS OR A COMPLAINT?

If you have concerns about the research that you think I, Muhammad, or my supervisor, Igor, can help you with, please feel free to contact (us) on mobile number [redacted] - Saudi Arabia and [redacted] Australia or email us at [redacted] and Dr. Abdullah Alghamdi Faculty of Computing and Information Technology King Abdulaziz university, Jeddah, Saudi Arabia at aalmalaise@kau.edu.sa .

If you would like to talk to someone who is not connected with the research, you may contact the Research Ethics Officer on 02 9514 9772, and quote this number (UTS HREC Approval Number: ETH16-0548)

UNIVERSITY OF TECHNOLOGY SYDNEY

صحيفة المعلومات الخاصة بالبحث

موضوع البحث: العوامل المساهمة في الأداء النسبي لحاضنات الأعمال التقنية في المملكة العربية السعودية

(رقم اعتماد جامعة سيدني للتقنية: **TH16-0548**)

من الذي يجري البحث؟

اسمي محمد حاتم بن سواد، أحد طلاب جامعة سيدني للتقنية، (المشرف على الدراسة البروفيسور إيغور زتيويكزيروه)

موضوع البحث:

يهدف البحث للتعرف على العوامل المؤثرة تأثير الإبداع ومشاركة المعرفة ونشر الابتكار في أداء الحاضنات التقنية في المملكة العربية السعودية.

إذا قلت نعم ما الذي سأشترك فيه؟

سوف أطلب منكم المشاركة في المقابلة.

هل هناك أي مخاطر/ إزعاج

تقريبا لا يوجد أي مخاطر لأن البحث قد تم تصميمه بعناية فائقة. الجدير بالذكر مدة المقابله ٣٠-٤٥ دقيقة.

لماذا يطلب مني المشاركة

لقد طلب منك المشاركة في هذا البحث لأنك تشغل أحد المهام الرئيسية في الحاضنة التقنية

هل يجب علي أن أوافق؟

لا يجب عليك الموافقة

ماذا سيحدث في حال رفض المشاركة؟

لا شيء، سوف أشكرك على وقتك ولن أتصل بك بخصوص هذا البحث مرة أخرى.

إذا وافقت الآن هل يمكنني أن أغير رأيي لاحقا؟

يمكنك تغيير رأيك في أي وقت دون إبداء أسباب، سوف أشكرك على وقتك ولن أتصل بك مرة أخرى بخصوص البحث.

ماذا لو كان لدي مخاوف أو شكوى؟

إذا كان لديك أي مخاوف بخصوص البحث وتعتقد أني أو المشرف يمكنه مساعدتك نرجو عدم التردد في الاتصال بنا على رقم الجوال: [redacted] أو البريد الالكتروني ([redacted]) وعضو هيئة التدريس د. عبدالله الغامدي بجامعة الملك عبدالعزيز، جده، المملكة العربية السعودية، على البريد الالكتروني: (aalmalaise@kau.edu.sa)

إذا أردت التحدث إلى شخص غير مرتبط بالبحث يمكنك الاتصال بمسئول أخلاقيات البحث العلمي على رقم 0295149772، وذكر رقم اعتماد الجامعة للبحث:

ETH16-0548

APPENDIX C: Translation Certificate

PROFESSIONAL TRANSLATION

Proprietor: Khalid Hadaidi
License No. 408
J.C.C. No. 226726
C.R. No. 4030283743

مكتب المحترف للترجمة

لصاحبه/ خالد بن حسن حدايدي
رقم الترخيص ٤٠٨
رقم العضوية ٢٢٦٧٢٦
رقم السجل التجاري ٤٠٣٠٢٨٣٧٤٣

إقـرار

يقر مكتب المحترف للترجمة بأن النص المرفق باللغة الإنجليزية هو
ترجمة للوثيقة المرفقة باللغة العربية أو العكس

ACKNOWLEDGMENT

This is to certify that the enclosed English text is
a translation of the enclosed Arabic document or vice versa

مدير المكتب
Office Manager

15/10/2015

خالد بن حسن حدايدي
Khalid .H. Hadaidi

مكتب المحترف للترجمة
Professional Translation Office

المرجع: ١/١٨٢٥

جدة – حي الجامعة – أمام كلية الهندسة – هاتف: ٠١٢/٦٨١٥٩٠٨ – ٠١٢/٦٣٣٥٢٦٦ – ٠١٢/٦٨٩٨٤٩٩ جوال: ٠٥٠١٦٥٢٨٩٦
Jeddah – Aljamaah Dist. – Across from the Engineering College – Tel. 012/6815908 012/6335266 – 012/6898499 – Mobile 0504652896

APPENDIX D: UTS Human Ethics Approval

UNIVERSITY OF TECHNOLOGY SYDNEY

Research & Innovation
Building 1, Level 14
PO Box 123 Broadway
NSW 2007 Australia
T: +61 2 9514 9681
F: +61 2 9514 1244
www.uts.edu.au

UTS CRICOS PROVIDER CODE 00099F

12 September 2016

Professor Igor Hawryszkiewicz
School of Systems, Management and Leadership
CB11.06.110
UNIVERSITY OF TECHNOLOGY, SYDNEY

Dear Muhammad,

UTS HREC ETH16-0548 – (Igor Hawryszkiewicz, Muhammad Binsawad) – "The Influence Factors of Creativity, Knowledge Sharing and Diffusion of Innovation Towards Technology Business Incubators Performance in Saudi Arabia"

Thank you for your response to the Committee's comments for your project titled, " The Influence Factors of Creativity, Knowledge Sharing and Diffusion of Innovation Towards Technology Business Incubators Performance in Saudi Arabia ". Your response satisfactorily addresses the concerns and questions raised by the Committee who agreed that the application now meets the requirements of the NHMRC National Statement on Ethical Conduct in Human Research (2007). I am pleased to inform you that ethics approval is now granted.

Your approval number is UTS HREC REF NO. UTS HREC ETH16-0548.

Approval will be for a period of five (5) years from the date of this correspondence subject to the provision of annual reports. Your approval number must be included in all participant material and advertisements. Any advertisements on the UTS Staff Connect without an approval number will be removed. Please note that the ethical conduct of research is an on-going process. The National Statement on Ethical Conduct in Research Involving Humans requires us to obtain a report about the progress of the research, and in particular about any changes to the research which may have ethical implications. This report form must be completed at least annually from the date of approval, and at the end of the project (if it takes more than a year). The Ethics Secretariat will contact you when it is time to complete your first report.

I also refer you to the AVCC guidelines relating to the storage of data, which require that data be kept for a minimum of 5 years after publication of research. However, in NSW, longer retention requirements are required for research on human subjects with potential long-term effects, research with long-term environmental effects, or research considered of national or international significance, importance, or controversy. If the data from this research project falls into one of these categories, contact University Records for advice on long-term retention.

If you have any queries about your ethics clearance, or require any amendments to your research in the future, please do not hesitate to contact the Ethics Secretariat at the Research and Innovation Office, on 02 9514 9772.

Yours sincerely,

M R Haas

Professor Marion Haas
Chairperson
UTS Human Research Ethics Committee

UNIVERSITY OF TECHNOLOGY SYDNEY

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UTS CRICOS PROVIDER CODE 00099F

12 September 2016

Professor Igor Hawryszkiewicz
School of Systems, Management and Leadership
CB11.06.110
UNIVERSITY OF TECHNOLOGY, SYDNEY

Dear Igor,

UTS HREC ETH16-0548 – (Igor Hawryszkiewicz, Muhammad Binsawad) – "The Influence Factors of Creativity, Knowledge Sharing and Diffusion of Innovation Towards Technology Business Incubators Performance in Saudi Arabia"

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Yours sincerely,

M R Haas

Professor Marion Haas
Chairperson
UTS Human Research Ethics Committee