

The Influence of the Knowledge-Sharing Process on Technology Business Incubator Performance in Saudi Arabia

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Abstract

In the competitive global market, technology business incubators are considered to be the backbone of the economic development of a country. Technology business incubators are involved in the creation of employment opportunities, boosting the local economy, and commercializing innovative technologies. This research-in-progress will propose a framework for technology business incubators to examine the impact of the knowledge-sharing practices of incubatees on technology business incubator performance both in general and in Saudi Arabia in particular. The key findings of this study will allow technology business incubators to better formulate the incubation process.

Keywords: Technology incubator, Business incubator, Knowledge-sharing, Saudi Arabia

1. Introduction

Technology business incubation is an area where new ideas are combined with resources and expertise in order to produce viable products and businesses. A technology incubator is an entity that assists and encourages innovation. "The technology incubator is a entity where knowledge is transformed into innovative products and services" [70]. It is within this incubator that viable business entities and products arise from a mix of innovation, knowledge and their management. In the 1980s, assessing the performance of business incubators emerged as an essential tool for new business development and ultimately the growth of local economies [12]. However, there was a problem with the criterion adopted for such an assessment. The existing literature examines the influence of business incubation on the jobs created on business incubation [62], incubatee development [57] or incubatee graduation rates [47]. University-linked incubators, non-profit incubators and for-profit incubators were the different types of incubators studied [47]. A firm's competitive edge is greatly empowered by the firm's knowledge base [26]. The basis for the development of other vital resources is knowledge [68]. Enhanced innovation and economic development can potentially result from an understanding of the role played by incubators in the development of startups and assembling a resource base is one of the main challenges in creating new ventures. Various resources are required by new ventures to emerge successful [9]. To ensure the success, good performance and ongoing survival of a venture, intangible resources like knowledge are very important. With the development of a knowledge-based economy, technology and innovation are considered vital

elements of performance [52]. The ability of a number of business organizations, who together make up a business economy, are dependent for their success on their ability to innovate; a lack of such skills deprives them of a competitive edge and restricts their growth in businesses and profits [25]. Increases in output, an edge in competition and the wealth of a nation are controlled by innovation [10]. In the literature on business incubation, it is divided into two areas: industry based and academic based. Treating incubation as an agency that emphasizes the correlation between innovation and knowledge, academic scholars have focused on a specific element in the process of incubation while studying its evolution [61, 32, 3]. As a property-based enterprise providing services, both tangible and otherwise, technology incubators are specific business incubators that help arm entrepreneurs, tech-based firms and other affiliates of universities and large firms with the 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 the private and public sectors.

Incubators in the Kingdom of Saudi Arabia (KSA) are working to bring innovative businesses promising to contribute in the nation's technological growth. The Saudi incubators are designed for technology innovations, which are mainly established to serve as knowledge-based programs to produce opportunities that will lead to transforming the country into a knowledge-based society and consequently developing a knowledge-based economy. Like the rest of the world, KSA is developing technology incubators, although they are mostly at the preliminary stages of introducing technology and science parks. It has been noted in research that in developing countries, including KSA, technology incubators have not been able to meet expectations. They have not been contributing to the development of local economy, the transfer of technology, the creation of new enterprises, or increases in job creation [1]. A review of the literature indicates that technology incubation is in its developmental stages in KSA [34]. There are private-sector organizations working as technology incubators in Riyadh and Jeddah, especially those which offer fee-based facilities to aspiring entrepreneurs. However, Saudi technology incubators generally work from the platform of universities and not as independent units, thus the services provided by these technology incubators are based on limited funding and also a short range of services to clients [54]. There is a need to have a clear understanding of what their goals should be and how the goals should be achieved so that targeted assistance can be provided to budding entrepreneurs, who can then contribute substantially to the economic development of KSA. 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 by examining technology incubators in the Saudi Arabian context in order to empower the national incubation initiative. There is no sound foundation theoretically to the available knowledge of the process of business incubation [60]. Therefore, the inferences concerning business incubation and the effect they have on startups are not consolidated or clear [11]. 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 found by many academic scholars [68].

The aim of this research-in-progress study is to examine the impact of the knowledge-sharing practices of incubatees on technology business incubator performance in the Saudi context. The research question is how can the knowledge-sharing practices of incubatees influence technology business incubator performance in the Saudi context?

2. Literature Review

Incubators

Incubators are categorized into different types on the basis of the manner in which services are delivered, their organizational structure, and the types of clients being served [24]. 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 the wealth of local

regions, and transferred research and technology from universities and other organizations to the mainstream. The clients being served by incubators are at the frontline of developing innovative technologies, creating products, and providing services to citizens meant to enhance the quality of life in communities all across the globe. There are various types of incubators, such as business, technology and mixed/general. Business incubators are meant to develop and stimulate general businesses for specific economic objectives like industrial restructuring and the generation of revenue as well as the beneficial utilization of available resources [73]. 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 (1997). These incubators may include knowledge-intensive firms, but they may also comprise of low-technology firms working in services and light manufacturing. Technology incubators are the incubators which aim to bolster the technology development stage of enterprises and new businesses being promoted by business incubators [56]. That is why they are often categorized as a subtype or a variant of the latter. However, the primary objective of technology innovators that gives them their 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. The major types of incubators in the literature are thus business incubators and technology incubators. Although technology incubators are considered a type of business incubators [38].

The first technology incubator to be established in the Saudi Arabia was BADIR-ICT, which was launched in January 2008 [1]. As 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 the King Abdul Aziz City for Science and Technology. KSA allocated 8.6 billion dollars for research and development as a part of its 20-year National Science and Technology Plan [74]. As part of that, it has developed several projects that work particularly as business and technology incubators including the King Abdullah Bin AbdulAziz Science Park (KASP), the Saudi Organization for Industrial Estates and Technology Zones (SOIETZ), the Information Technology and Communication Complex (ITCC), the King Saud University Science Park (KSSP), the King Abdul Aziz City for Science and Technology (KACST), as well as many technology incubators, especially technology parks that are currently under planning.

Knowledge-sharing Process

Knowledge is a significant resource that helps to preserve the valuable heritage, learning techniques, problem-solving techniques and core competencies of organizations, and to initiate new useful situations [39]. Knowledge-sharing may develop competitive advantages for an organization such as the enhancement of intellectual capital by encouraging the exchange and creation of knowledge within itself. Furthermore, since knowledge is the key factor that works behind achieving continuous innovation, it is considered a closely related factor for the progress of any organization, thus it is also a crucial indicator to be studied in the efficient performance of technology incubators. Van den Hooff and Van Weenen make a distinction between the two different forms of knowledge-sharing that can also be beneficial for a technology incubator [63]: (i) knowledge-donating and (ii) knowledge-collecting. In turn, knowledge-sharing is dependent upon knowledge management, which is an essential activity in all businesses. Any knowledge-sharing happening within organizations between its employees will always be based upon both knowledge-donating and knowledge-collecting. Knowledge management is a broader term that caters to a wide range of topics, while knowledge-sharing is specific focus area of knowledge management [28]. 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 [37].

3. Theoretical Background and Research Model

Developing a theoretical model depends upon general theoretical understandings from relevant studies and existing empirical evidence pertinent to the phenomenon under investigation. Therefore, this section briefly reviews several related models and theories in order to develop the proposed model. These theoretical foundations include existing models related to knowledge-sharing. The literature available on research carried in technology incubators is limited, so studies conducted in organizational settings that could provide a theoretical foundation for the study are also cited. Figure 1 shows the research model and Table 1 presents a definition of each factor.

The knowledge-sharing process consists of two dimensions: knowledge-donating and knowledge-collecting [63]. This describes the process where employees mutually transfer and create knowledge. The literature review show factors for knowledge-sharing are classified into individual and organizational dimensions [37, 16]. The most frequently studied factors in knowledge-sharing individual dimensions are self-efficacy [40, 66], enjoyment in sharing knowledge [40], and interpersonal trust [6, 42, 18, 21]. The most frequently studied motivational factors in knowledge-sharing organizational dimensions include management support [69, 50, 2, 58], information technology infrastructure [29, 64], and incentives and rewards [5, 69, 18]. There is a model that was developed to examine the influence of individual (enjoyment and self efficacy), organizational (top management support, organization rewards) and technology factors (IT use) on the knowledge-sharing process towards a firm's innovation capability [40]. The findings show that how firms promote a knowledge-sharing culture can sustain their innovation performance. Another model was developed to examine the relationship between knowledge process and enablers (such as organizational context and technological context) towards organizational creativity and performance [15]. The findings show that organizations could achieve economic benefits by utilizing knowledge enablers and organizational creativity in an effective manner. Additionally, Wang and Wang's research investigates the relation between knowledge-sharing, innovation and organizational performance [65]. The results show that knowledge-sharing and innovation speed have significant effects on financial and operational performance.

Regarding the technology business incubator performance, there is no defined and single explained standard to measure incubator performance [48]. There are several studies that discuss different indicators to determine incubator performance [41]. For example, Rothaermel and Thursby examined university-based incubators by looking at the performance of tenants, revenues generated, total funds raised, venture capital funding obtained and whether the firm graduated, failed, or stayed in the incubator [53]. Mian defines four categories of performance outcomes for university technology business incubators: (a) the program's sustainability and growth, (b) tenant firm's survival and growth, (c) contributions to the sponsoring university's mission, and (d) community-related impacts [43]. In the context of the current study, the researcher used Mian's assessments of incubator performance.

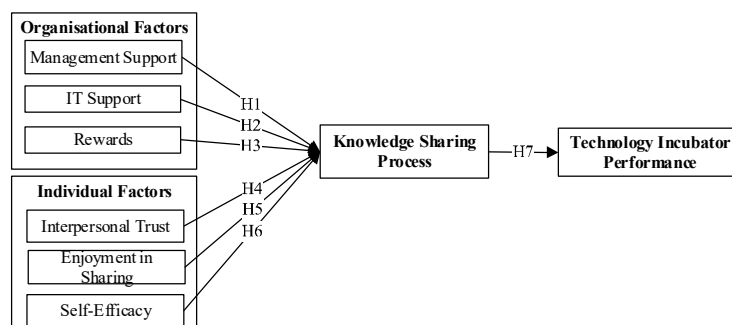


Figure 1: Research model

Table 1: Factor description

Factor	Description	Source
Knowledge-sharing 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.”	[63, 40]
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 knowledge refers to “knowledge workers who derive enjoyment from helping others may be more favorable oriented toward knowledge sharing and more inclined to share knowledge – in terms of both donation and collecting.”	[40, 21] [66, 67]
Knowledge-sharing organisational factors	Management support refers to “the degree to which the top management support the organisational climate of knowledge-sharing by providing sufficient resources and influencing the employee willingness to share knowledge” IT support refers to the “level to which facilitating knowledge-sharing through information technology use.” Rewards refers to “the degree to which a reward system to share any new and creative ideas and effectiveness knowledge-sharing.”	[64, 58, 27, 29, 69]
Technology business incubator performance	Performance outcomes: <ul style="list-style-type: none"> • Program growth and sustainability (such as, growth in budget, space, facilities, services, tenants and staff) • Tenant firms' survival and growth (such as, sales growth, employment growth) • Contributions to sponsoring universities' missions Community-related impacts (such as, sales, revenues, taxes, exp, and graduate's employment etc.)	[43,44]

Hypotheses Development

Motivational Factors for Knowledge-Sharing – Organizational Dimensions

Management support: Effective use of knowledge implicates the involvement of leadership related to vision [27]. Management support is important in promoting a knowledge-sharing culture [50, 2]. According to Wong’s study, leaders are role models for showing the knowledge-sharing behavior in organizations [69]. Additionally, leadership affects knowledge-sharing behavior such that managers need to encourage and guide staff participation in knowledge-sharing activities [64, 58]. Hence:

H1: Management support has a significant positive impact on knowledge-sharing practices (donation and collection) in Saudi technology incubators.

Information technology (IT) support: Information technology support is important in knowledge flows that improve the facilitation of the sharing of knowledge [29]. For example, IT infrastructure consists of hardware and software used to support staff in sharing knowledge

[64] and enhance the scope and timeliness of knowledge-sharing. For that reason, giving staff adequate training to apply technology in knowledge-sharing is encouraged [27]. Therefore:

H2: Information technology has a significant positive impact on knowledge-sharing practices (donation and collection) in Saudi technology incubators.

Rewards: Providing incentives and rewards to motivate staff to contribute in knowledge-sharing adoption are recommended [69]. Individuals who share their knowledge may improve team performance and consecutively increase the personal rewards received [5]. Incentives and rewards encourage staff to share knowledge [7]. For example, monetary and non-monetary value [5] have immediate impacts on motivation concerning knowledge-sharing with colleagues [33]. Accordingly:

H3: Rewards have a significant positive impact on knowledge-sharing practices (donation and collection) in Saudi technology incubators

Motivational Factors for Knowledge-sharing – Individual Dimensions

Interpersonal trust: Studies shows that trust between staff can encourage collaboration [6] and individuals are more motivated to provide useful knowledge when there is interpersonal trust. Without trust, individuals may become less willing to share knowledge with others [41, 18]. Therefore, interpersonal trust increases individuals' inclination to engage in knowledge-sharing activity [21]. Hence:

H4: Interpersonal trust has a significant positive impact on knowledge-sharing practices (donation and collection) in Saudi technology incubators.

Enjoyment in sharing knowledge: Previous studies show that employees are inherently interested in donating knowledge because of the enjoyment gained from helping others [66, 67]. Thus, employees may be more favorably oriented toward knowledge-sharing in terms of both donation and collection [40]. Therefore:

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

Self-efficacy: Self-efficacy is an individual's judgment of his or her ability to organize and execute successful performance in everyday tasks [40]. The individual's sense of self-efficacy is affected by the tendency of individuals to take actions such as level of problems, expressed interest, persistence and task effort [23, 4]. Lin's study shows that knowledge-sharing contributions improve an organization's performance if staff increase their willingness to donate and collect knowledge [40]. Accordingly:

H6: Self-efficacy has a significant positive impact on knowledge-sharing practices (donation and collection) in Saudi technology incubators.

Knowledge-sharing Practices

Effective knowledge processes can create important organizational intellectual capital and intangible resources to improve performance [45]. For example, when the staff transfer tacit knowledge into explicit knowledge, the entire organization will benefit from it [19]. This shows that when organizations manage their knowledge assets better, the organization will then have a greater chance of better performance in the market [19,49].

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

4. Conclusion and Future Work

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 consequently developing a knowledge-based economy. This research is unique in the sense that it examines technology business incubator performance by studying the incubation process, such as the knowledge-sharing process, which

are important in the developmental process of new ventures. This is the first research to investigate technology business incubators in Saudi Arabia.

- The key findings of this study will help the Saudi Arabian technology business incubators to better formulate the incubation process.
- This study will propose guidelines to improving the performance of technology business incubators in general and in Saudi Arabia in particular.

This study is an attempt to fill a gap in the research by providing a viable framework for assessing and managing technology business incubators operating in the Saudi Arabia environment. Furthermore, it will statistically test the effects of knowledge-sharing practices on technology business incubators in Saudi Arabia. This research will apply mixed methods (quantitative and qualitative approach) to answer the research question and test the hypotheses. Stage one of the research study will employ a quantitative method, and a survey will be used to collect the data from the study sample about their influencing factors that will then be used in the research framework. A survey provides a numeric or quantitative trends description of a population's opinions and attitudes based on studying a sample of this population [17]. Data will be collected from various technology incubators in Saudi Arabia.

Stage two of the research study will employ a qualitative research method and will be carried out to validate the quantitative results. A multi-case study approach will be used for qualitative data collection, including conducting semi-structured interviews with managers in technology incubators in Saudi Arabia.

Population and Sample

The population of this study will be employees at technology incubators in KSA. The sample consists of employees at 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, the Saudi Organization for Industrial Estates and Technology Zones (SOIETZ), and the Information Technology and Communication Complex (ITCC) technology incubators.

Data Analysis Process

A closed-ended questionnaire will be used for the survey and an open-ended questionnaire will be used for interviews. Before collecting the data, ethics approval will be obtained from the ethics committee. The quantitative data will be analyzed using SPSS and SmartPLS software. After receiving the surveys from the participants, specific statistical techniques will be used in this research to analyze the data gathered from the field surveys. The data analysis serves three main aims: (1) obtaining a feel for the data by checking the central tendency and the dispersion; (2) testing the sufficiency of the data by measuring reliability and validity; and (3) testing the hypotheses which were developed for the research [55].

A partial least squares (PLS)-based structural equation modeling (SEM) technique, which is a second generation multivariate data analysis tool, will be used to analyze the data gathered from the quantitative survey [13]. The PLS analysis provides a general model approach to map paths to the dependent variables and to simultaneously analyze all the paths at the same time [20, 22]. The PLS technique is increasingly used in information systems research due to its ability to model small-to-medium sample sizes [31]. For qualitative analysis, data collected from interviews will be interpreted to validate the quantitative results.

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