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Enhancing Innovative Capability and Sustainability of Saudi Firms

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Abstract: The Saudi Arabian government has recognised the need for an alternative path to national development in the form of a knowledge-based economy (KBE). One of the key drivers of a knowledge-based economy KBE is innovation. Therefore, to achieve this aim, it is important to understand the various factors affecting organisational innovation capability and sustainability. This empirical research study was conducted to provide a better understanding of the interrelationships among the key constructs, socio-technical factors, diffusion of innovation, and knowledge-sharing process towards Saudi organisational innovation capability. The results offer a number of implications, which are beneficial towards the adoption of the knowledge-based economy seeking to enhance the Saudi organisations towards enriching the organisational innovation capability and sustainability.

Keywords: socio-technical; diffusion of innovation; knowledge-sharing; innovation capability

1. Introduction

The government of Saudi Arabia has developed a plan to transition from a natural resources economy to a knowledge-based economy (KBE) [1]. KBE refers to the creation, distribution, and implementation of knowledge as a key engine of growth and wealth production [2]. The three supporting pillars of a knowledge-based economy are the socio-technical imperative, knowledge-sharing and an organisation innovation capability (OIC). Socio-technical factors or enablers support the ability to share knowledge and increase the ability to share knowledge, in large measure through top management support, information systems infrastructure, interpersonal trust and the presence of a reward system. Diffusion of innovation (DOI) also relates to the effectiveness of sharing knowledge.

The government of Saudi Arabia has associated the development of a knowledge-based economy with increasing innovative output from that society [1]. Although knowledge has been studied at inter-firm [3] and intra-firm levels [4], the association of the level of knowledge in the wider community with the innovativeness of firms is not clear. It may be posited that a society with a higher level of knowledge will be more innovative than a society with a lower level of knowledge [5]; however, it is not clear how knowledge within a society contributes to increasing innovation by firms that exist as part of that society. Specifically, it is not clear how the knowledge cycles of individuals within a society interact in order to positively influence the innovative output of firms and individuals within that society. Innovation has been defined in many ways to confine to new goods, services, processes and organisational applications [6]. However, regardless of what definition is used, innovation is generally viewed positively because of its association with the creation of value for firms and individuals [7]. Governments have a key role in increasing the ability of innovation for both private and public companies [8]. This is due to the perception that innovation not only enriches firms but also has a positive economic return on the host state [8]. The Kingdom of Saudi Arabia is one state

whose government has identified that increasing innovation is required in order to meet the strategic economic goals of the government [1]. Saudi Arabia's participation in the World Trade Organisation is a clear indication that it wishes to be a major participant in the other economies. The transition from a natural resource-based economy to a knowledge-based economy is not automatic. It can only occur if it is supported by careful policies constructed on the basis of access to information about how other countries engaged in similar processes of change. Other countries will mostly have developed a knowledge-based economy from a far more balanced and strong foundation in terms of social, technological and economic development than exists in Saudi Arabia. Saudi Arabia should examine the successes and failures that other countries experienced in their transition to a knowledge base. However, research specifically oriented to the problems of Saudi Arabia is also a precondition for success in restructuring Saudi Arabia to compete internationally. One of the factors that has been positively associated with innovation is knowledge [6]. Knowledge can be simply defined as information that enables action to be taken [9]. Although there are other definitions, this definition is sufficient for the purpose of understanding knowledge and attempting to develop tools that increase the level of knowledge within a firm or a society. Knowledge has been shown to evolve in a cyclical fashion [10] and can be the result of interaction between agents (such as individuals or firms) [11]. Thus, the interaction of agent-specific knowledge cycles may be influential in the development of knowledge within a society. Business firms in today's globalised world must innovate to compete, such that the firm innovation capability may provide an indication concerning how companies can foster knowledge-sharing culture to maintain their innovation performance [12].

This paper is an extension of the author's work published in the 25th Australasian Conference on Information Systems (ACIS2014) [13]. By studying the relationships between knowledge-sharing critical factors, processes and organisational innovation capability, this research investigates how Saudi Arabia organisations can promote a knowledge-sharing environment that will sustain their innovation capabilities. Previous studies have indicated that the successful adoption of innovation often needs a knowledge-sharing process (collection and donation) that can enrich innovation capability. This study argues that a combination of contextual factors or enablers (e.g., social and technological) and various innovation characteristics have the potential to influence a Saudi organisation's intention to share knowledge towards innovation. No existing research has examined these relationship practices in the different industries and sectors in a developing country like Saudi Arabia. This study will provide significant data and background information to address the current gap in the knowledge. The following research questions have been formulated to address the research gaps related to the current study: (1) How does socio-technical and diffusion of innovation factors influence knowledge sharing in Saudi organizations? (2) In what way and to what extent do the affected knowledge-sharing processes influence Saudi organisational innovation capability?

2. Related Studies

2.1. Knowledge Sharing

According to [14], knowledge is both tacit and explicit. Tacit knowledge is unarticulated and based on actions and experiences in context, while explicit knowledge is articulated in some symbolic form. Knowledge-sharing has become a key concern for organisations because of the growing recognition that tacit knowledge is more valuable than explicit knowledge [15]. Recently, many companies have recognised that the tacit knowledge of their employees represents invaluable organisational intellectual capitals [16]. The literature usually identify socio-technical factors in the area of knowledge sharing, such as "Top Management Support": top management has a close relationship with knowledge sharing. Many researchers have acknowledged that the success of sharing knowledge or experience among staff fundamentally depends on the support of the senior managers' adoption of knowledge-sharing initiatives [17,18]. A reward system is seen as important in supporting knowledge-sharing activities by the organizations [12]. In [19], the authors state that incentives, a bonus system, and promotion

that are based on knowledge sharing will strengthen attitudes towards sharing knowledge within an organisation. Interpersonal or co-worker trust is vital to successful knowledge-sharing. In addition, according to [20], IS/IT infrastructure significantly influences the knowledge-sharing process and the application of the company in a positive way.

2.2. Diffusion of Innovation

A comprehensive definition that adequately addresses the intangible aspect of innovation as well as its physical manifestations are given by [21], who says that innovation is a multifaceted process implying creative activity and involving new understanding and insights, the development of a new product or process or the creation of new capital and markets. In [22], the authors argue that before it can judge how an innovation is working in practice, management should keep in mind two factors: the pre-existing business structure and operation and the business strategy it is adopting to drive the innovation. In addition, apart from the focus on the needs of the enterprise for innovation, there also is an external context related to whatever level of open competition exists for a company's operations. The Diffusion of Innovation (DOI) model provides an understanding of how the diffusion of innovation process works as a result of the four elements: an innovation; communication channels through which the idea is communicated; the time required for this communication process; and the members of a social system between whom the communication takes place [23]. Innovation diffusion theory posits that there are five perceived innovation characteristics that influence adoption [23]: relative advantage, compatibility, complexity, observability, and the trialability. Of these characteristics, only relative advantage, compatibility, and complexity were included in the research model. Firstly, since knowledge-sharing has a long-term impact, management is less concerned with observability of knowledge-sharing. Secondly, knowledge-sharing involves significant organisational change, and it is difficult to reverse its effects. Thus, the trialability is unlikely to be a major managerial consideration. Thirdly, these three characteristics have consistently been found to be important influences on behavioral intention [24]. Innovation capability refers to the ability to generate innovations at a fast rate, achieving competitive advantages for the organisation concerned [25]. Another definition of innovation capability is "the ability to create innovations in responding to contextual changes and opportunities without organisational disruption, excessive time and costs, or loss of performance" [26].

3. Research Model and Hypothesis Development

The relevant literature on different success factors towards organization innovation capability is reviewed in order to enable development of the research conceptual model and hypothesis. Frequently cited theoretical models or frameworks on knowledge-sharing enablers and processes and innovation or innovation capability are investigated. Finally, the relevant constructs and sub-constructs are identified, with the justification of their selection with the current study's research model. However, the existing research models prevent a comprehensive understanding towards organization innovation capability in a Saudi firm's context, which helps to contribute to Saudi knowledge-based economy initiatives.

In [27], the authors investigated the relationships between knowledge-sharing, absorptive capacity and innovation capability in Taiwan's knowledge-intensive industries. The study found that absorptive capacity is the intervening factor between knowledge-sharing and innovation capability. In [28], the authors examined the relationship between knowledge management processes and enablers such as organisational structure, culture, and information technologies. The study finds that knowledge management processes are significant predictors for organisational creativity, meaning that business organisations can achieve the strategic and economic benefits of knowledge management by utilising organisational creativity in an effective manner. In [1], the authors designed a model to investigate how knowledge management (KM), national culture and other country-specific factors are influencing Saudi Arabia's efforts to develop a knowledge economy.

In [29], the authors presented the relationship between knowledge-sharing, innovation, and performance in an organisational setting. The model was empirically tested using data collected from 89 high technology firms in China. The study found that both explicit and tacit knowledge-sharing practices support innovation and performance. Explicit knowledge-sharing has more significant effects on innovation speed and financial performance, while tacit knowledge-sharing has more significant effects on innovation quality and operational performance. In [30], the authors proposed a model designed to examine the influence of individual, organisational and technology factors on knowledge-sharing processes and whether having more processes leads to superior firm innovation capability. The results show that organisational factors significantly influence knowledge-sharing processes. Table 1 summarizes previous research models.

Table 1. Summary of the previous research models.

Source	Examined Factors	Method	Constructs Relationship
[1]	Knowledge-sharing factors	Development of KE model of Saudi Arabia	Knowledge-sharing factor → knowledge Economy(innovation)
[12]	• Organisational factors (TMS) • Organisational reward • Knowledge donating • Knowledge collecting • Firm innovation capability • Trust (trustworthiness of e-government)	Quantitative surveys of 172 employees from different organisations in Taiwan	• TMS → knowledge donating • TMS → knowledge collecting • Rewards → knowledge donating • Rewards → knowledge collecting • Knowledge donating → innov capability • Knowledge collecting → innov capability
[27]	• Knowledge-sharing processes (donation and collection) • Innovation capability	Quantitative surveys of Taiwanese employees	• Knowledge donating and knowledge collecting to Innovation capability
[28]	• KM enablers (trust) • KM processes	Quantitative surveys in Korea organisational settings	• Trust to KM processes
[29]	• Knowledge sharing (tacit and explicit) • Innovation	Quantitative surveys of firms in China	• Knowledge-sharing • Innovation
[31]	• Level of ICT usage • Knowledge donation • Knowledge collection	Quantitative study or 502 respondents from an Iranian petroleum firms	• ICT → Knowledge donating • ICT → knowledge collection
[32]	• Senior Management Support • Trust • Knowledge based rewards System • Technological condition • Knowledge sharing behaviour • Individual innovation capability	Quantitative surveys for 125 Indonesian telecom companies	• Management support • Trust • Rewards → knowledge-sharing technology but it were mediated by the intention of sharing knowledge usage • Knowledge sharing → innovation capability

The proposed model is comprised of four main constructs:

Socio-Technical Factors (STF),
of Innovation (DOI),
Knowledge-Sharing Processes (KSP),
Innovation Capability (OIC).

Each of these constructs is briefly explained below. Appendix Tables A1 and A2 shows all items used in the survey.

3.1. Hypothesis Development

The proposed conceptual model, presented in Figure 1, broadly depicts the possible relationships connecting the four constructs (STF, DOI, KSP and OIC). To confirm these relationships, a literature search was conducted to find the theoretical evidence through which the hypothetical relationships of the above constructs were linked. These relationships were proposed as a set of research hypotheses to address the research questions. The conceptual model indicates the potential relationships between STF and DOI to KSP (donation and collections) towards OIC. However, these relationships were based on a theoretical understanding from the literature review, and there is limited direct empirical evidence that examines this. The constructs of DOI (perceived relative advantage, compatibility, and complexity) are applied in this study as independent variables in relation to dependent variable knowledge-sharing. This is consistent with [33], in which the authors used 'perceived relative advantage', 'compatibility' and 'complexity' as independent variables to dependent variable 'intention to encourage knowledge sharing,' and the results shows that the relationships were significant. Therefore, the concept of DOI is adopted as an independent variable. The sample for the proposed model [33] was drawn from a Taiwanese company's senior executives. However, a further study is required as cultural differences exist among organisations, in particular, in Saudi organisations. The other independent variables for social-technical factors (top management support, IS infrastructure, interpersonal trust and reward system) are consistent with [31,32]. These studies found a statistically significant relationship of social-technical factors towards knowledge-sharing. Therefore, in this study, social-technical factors (top management support, IS infrastructure, interpersonal trust and reward system) are adopted as independent variables and a significantly positive relationship with knowledge-sharing is proposed. The literature review helped to formulate the following research hypotheses.

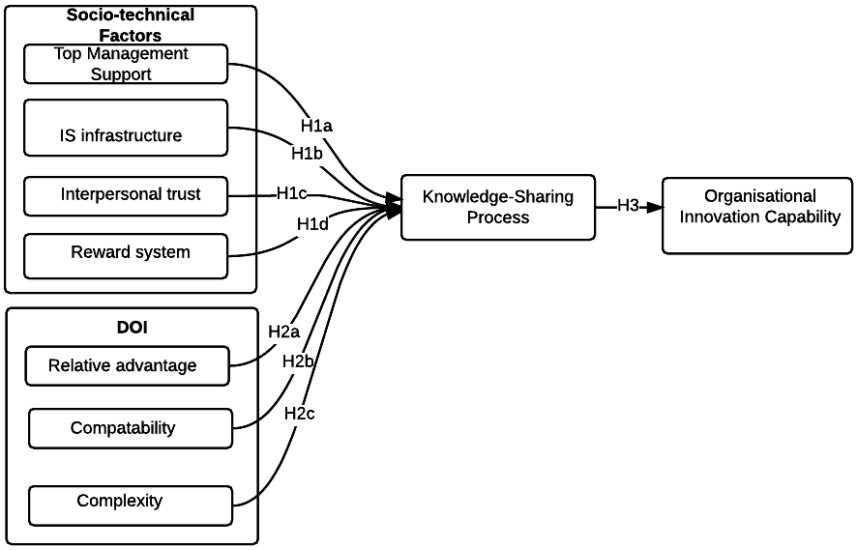

Figure 1. Proposed research model.

3.2. Socio-Technical Factors (STF)

Socio-technical factors are the factors from social and technical dimensions that provide the support needed to increase the ability to share knowledge. The four STF constructs examined in this research are as follows:

- *Top management support* (TMS) 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.

- *Information Systems infrastructure* (IS) refers to the level to which knowledge-sharing is facilitated through knowledge repositories, an integrated set of components for gathering, storing and disseminating information to enhance the collaboration and communication around the organisation.
- *Interpersonal trust* (trust) refers to the degree to which the trust between co-workers exists concerning sharing feelings and perceptions, sharing personal information and experiences and the level of trust between employees and their trustworthy relationships. It also includes the existence of trust policies and procedures to protect the action of sharing the knowledge between co-workers.
- *Reward system* (Rew) refers to the degree to which an individual gains benefits by collaborations and teamwork rather than individual effort.

Top management has a close relationship with knowledge-sharing. Many researchers have acknowledged that the success of sharing knowledge or experience among staff fundamentally depends on the support of the senior managers' adoption of knowledge-sharing initiatives [17,18]. Additionally, TMS is a very important resource that can influence how employees deal with knowledge inside organisations [34].

H1a: Top management support positively influences knowledge-sharing processes (donation and collection) towards Saudi organisation innovation capability.

The IS infrastructure of a company has an important role in facilitating KSP in the organisation [35]. IS/IT infrastructure enables the process of exploring, accessing and retrieving information to be faster. As required by any organisation, the use of IS infrastructure can facilitate knowledge-sharing via applications such as groupware and intranet virtual communities. Within organisations, different systems can be used to enable the sharing of knowledge through denoting or acquiring knowledge via knowledge bases, where employees share knowledge electronically and access to shared practices becomes available to other staff members [24]. As was found by research [20], IS/IT infrastructure positively influences the knowledge-sharing process and the application of the company in a significant way.

H1b: Information Systems infrastructure positively influences knowledge-sharing processes (donation and collection) towards Saudi organisation innovation capability.

Trust is an essential factor in the social exchange process [28]. Interpersonal or co-worker trust is vital to successful knowledge-sharing. If a relationship based on trust is established, then it will facilitate knowledge-sharing among co-workers. Interpersonal trust is defined as co-workers having a good level of faith in each other in terms of intentions and behaviours [12]. Interpersonal trust between workers is an important factor in organisations and is believed to be a strong contributor to sharing knowledge [28].

H1c: Interpersonal trust positively influences knowledge-sharing processes (donation and collection) towards Saudi organisation innovation capability.

The existence of an organisational reward system is seen as important in supporting knowledge-sharing activities within organisations [12]. For example, incentives, a bonus system and promotion based on knowledge-sharing will strengthen attitudes towards sharing knowledge within an organisation [18]. An organisational reward system that is based on knowledge-sharing can create knowledge access inside an organisation [36].

H1d: Reward system positively influences the knowledge-sharing processes (donation and collection) towards Saudi organisation innovation capability.

3.3. Diffusion of Innovation (DOI)

Diffusion of innovation characteristics refers to the seven identified dimensions that can be used to analyse the characteristics of new phenomena in the organisation [23]. Innovation diffusion theory by Rogers [23] posits that there are five perceived innovation characteristics that influence adoption: relative advantage, compatibility, complexity, observability and trialability. Of these characteristics, only relative advantage, compatibility and complexity were included in the research model. Firstly, since knowledge-sharing has a long-term impact, management is less concerned with observability of knowledge-sharing. Secondly, knowledge-sharing involves significant organisational change, and it is difficult to reverse its effects. Thus, trialability is unlikely to be a major managerial consideration. Thirdly, these three characteristics have consistently been found to be important influences on behavioural intention [24].

These are:

- Perceived relative advantage (RA): the degree to which encouraging knowledge-sharing is perceived to benefit the conduct of business.
- Compatibility (Com): the degree to which encouraging knowledge-sharing fits into the existing business process.
- Complexity (Cox): the degree to which encouraging knowledge-sharing is difficult or an effort.

H2a: Perceived relative advantage positively influences knowledge-sharing processes (donation and collection) towards Saudi organisation innovation capability.

H2b: Compatibility positively influences knowledge-sharing processes (donation and collection) towards Saudi organisation innovation capability.

H2c: Complexity positively influences knowledge-sharing processes (donation and collection) towards Saudi organisation innovation capability.

3.4. Knowledge-Sharing Processes (KSP) and Organisational Innovation Capability (OIC)

Knowledge-sharing processes are the processes of donating and collecting knowledge. These are defined as:

- *Knowledge donation* (Don) refers to the action of employees to pass on their intellectual capital in an organisation.
- *Knowledge collection* (Col) refers to the action of employees asking for advice from each other in order to build intellectual capital.

The organisational innovation capability is the organisation's intention of increasing their ability to develop new and creative ideas in order to bring new innovative products or services that will increase the organisation's competitive edge.

Previous studies have found that knowledge sharing processes are significant predictors for organisational innovation capability, meaning that business organisations can achieve the strategic and economic benefits of knowledge sharing by utilising organisational innovation capability in an effective manner. Employee willingness to both donate and collect knowledge enables the firm to improve its innovation capability [12]. Knowledge-sharing not only has a positive relationship with performance directly, but it also influences innovation, which, in turn, contributes to firm performance [29].

H3: Employees' knowledge-sharing processes (donation and collection) positively influence Saudi organisation innovation capability (OIC).

4. Research Methodology

This study used a survey methodology to collect the data. The survey was distributed to employees in different organisations from the selected industries in Riyadh, Saudi Arabia between July

2014 and February 2015. A total of 20 organisations were randomly selected from the top 1000 firm's lists in Saudi Arabia's Ministry of Labor. Selected organisations belong to food manufacturing, textile, transport, and storage, oil, petroleum and mining. Six hundred questionnaires have been distributed, and 257 were completed and returned, which represents a response rate of 42.83%. The scales implemented in this survey were developed originally in English. However, it was necessary that they were translated in Arabic to be used in Saudi Arabia's organisations. Two certified translators translated the English version to Arabic. Forward and backward translation was performed to compare item by item to assess the accuracy of the translation and the most accurate translation was placed in the final version of the questionnaire. The validity of the survey was established in previous studies. A pre-test by was conducted in order to identify issues that needed to be revised before executing the major questionnaire. The instrument was pretested in different stages with a small sample of participants to identify problems that may be encountered and to ensure the questions and the translation were clearly understood. All constructs were measured using five-point Likert-scale statistical measures (ranging from 1 = strongly disagree to 5 = strongly agree). Measurement items were operationally adapted from previous studies. Top management support was derived from [12]. Reward system and IS infrastructure was adapted from [37]. Perceived relative advantage was adapted from [28,33]. Perceived compatibility was adapted from [24,33,38]. Perceived complexity was adapted from [33,39]. Knowledge-sharing processes were adapted from [12,40,41]. Organisational innovation capability was derived from [12,42].

The structural equation modelling (SEM) method was used to investigate the causal relationships of the model [43]. SEM was used as an extension of the previous technique factor analysis. Relatively, the SEM helps to integrate path analysis and factor analysis by involving two steps in this process: validating the measurement model and fitting the structural model after the confirmatory factor analysis CFA and through path analysis. The SEM was performed using smartPLS 3.0 software (Bönningstedt, Germany) [44].

5. Data Analysis

The measurement models were evaluated by examining internal consistency, convergent validity, and discriminant validity. Internal consistencies (Cronbach's alpha) of all variables were higher than the adequate benchmark of 0.70. According to [45], a value of the corrected item-total correlation scale of lower than 0.30 indicates that the variable is measuring something different from the construct as a whole. All items' total correlations were greater than 0.30. Convergent and discriminant validity were assessed by applying the average variance extracted (AVE) and items' loadings were at least 0.70 and are more strongly on their assigned factor rather than on the other factor. Table 2 shows the Cronbach's reliability, composite reliability and the AVE of all constructs values exceed the recommended value of 0.70.

Table 2. Internal consistency, convergent validity and discriminant validity.

	AVE	CR	C-Alpha	TMS	IS	Trust	Rew	RA	Com	Cox	Don	Col	OIC
TMS	0.81	0.91	0.88	**0.90**									
IS	0.73	0.86	0.82	0.16	**0.88**								
Trust	0.75	0.87	0.81	−0.13	0.07	**0.86**							
Rew	0.73	0.84	0.73	0.10	−0.10	0.10	**0.84**						
RA	0.81	0.87	0.81	0.13	0.04	−0.07	0.02	**0.90**					
Com	0.88	0.89	0.91	−0.25	−0.01	0.10	0.05	0.07	**0.93**				
Cox	0.84	0.88	0.82	0.08	0.10	0.05	−0.13	−0.1	0.02	**0.85**			
Don	0.88	0.90	0.87	0.47	0.20	0.01	0.03	0.1	0.07	0.14	**0.93**		
Col	0.73	0.87	0.81	−0.13	0.04	−0.07	0.13	0.04	0.07	0.02	0.13	**0.88**	
OIC	0.75	0.84	0.73	0.25	0.01	0.10	−0.05	0.07	0.13	0.04	0.07	0.02	**0.86**

Notes: TMS: Top Management Support, IS: IT infrastructure, Rew: Reward, RA: Relative Advantage, Com: Compatability, Cox: Complexity, KSP: Knowledge-sharing process; OIC: Organisational Innovation Capability; The diagonal numbers are the square root of the AVE.

Model Testing

The structural model was tested by examining the significance of the path coefficients and the (R^2) variance for the dependent variable. The significance of the paths was determined using the *t*-statistical test calculated with the bootstrapping technique. A five percent significance level was employed.

As shown in Table 3 and Figure 2, the results confirm the relationship between socio-technical factors and the knowledge sharing process, thus H1a to H1d are supported. In addition, H2a is also supported which shows a significant relationship between relative advantage and the knowledge sharing process. However, the relationship is insignificant at a 0.05-confidence level for H2b and H2c. In addition, the relationship between the knowledge sharing process and organisational innovation capability is positively significant. In addition, the model shows 41% variance in the knowledge-sharing process (R^2 = 0.16) and 37% variance in organisational innovation capability (R^2 = 0.50).

Table 3. Hypothesis testing.

	Path	*t*-Statistics	*p*-Value [1]	Supported?
H1a	TMS → KSP	1.98	0.04 *	Yes
H1b	IS → KSP	2.15	0.001 *	Yes
H1c	Trust → KSP	2.27	0.000 **	Yes
H1d	Rew → KSP	1.99	0.000 *	Yes
H2a	RA → KSP	2.24	0.001 *	Yes
H2b	Com → KSP	0.57	0.190	No
H2c	Cox → KSP	0.31	0.790	No
H3	KSP → OIC	3.91	0.000 *	Yes

[1],* Significant at 0.05 level; ** Significant at 0.01 level.

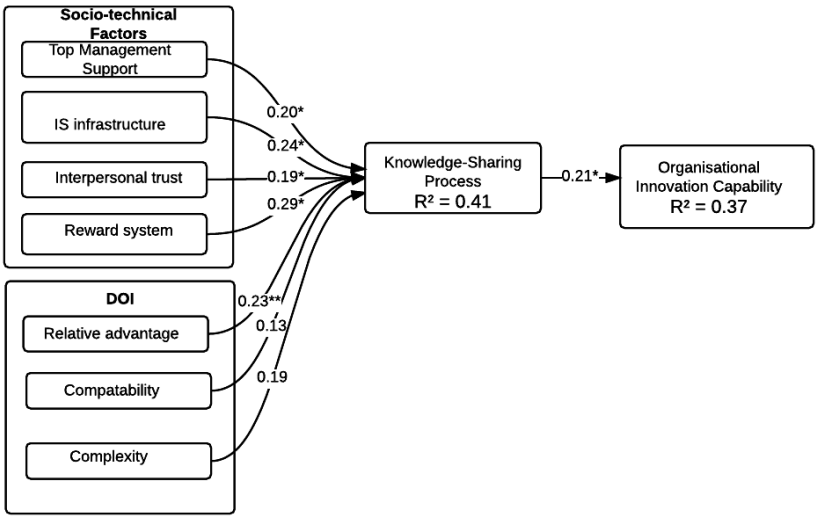

Figure 2. Path testing. * Significant at 0.05 level; ** Significant at 0.01 level.

6. Discussion

The current research study was conducted to provide a theoretical progression in the area of knowledge-sharing and innovations together, as well as to identify practical contributions for the management of knowledge within Saudi Arabia from an organisational perspective. The findings showed that how Saudi Arabian organisations can promote a knowledge-sharing environment that will sustain their innovation capabilities. In an increasingly competitive environment, Saudi firms turn to innovations to increase their revenue-earning potential. However, the risks are high because mistakes

can lead to the complete breakdown of a firm's business strategy. It is therefore imperative that Saudi firms develop the capability to innovate at a fast rate and at a sustainable level. Moreover, despite the benefits that innovation can provide, many Saudi organisations find successful and sustainable innovation difficult to achieve. Saudi firms are increasingly investing more resources in research and development (R&D), yet this study has shown that investment by itself does guarantee the development of OIC and knowledge-sharing to improve organisational performance. In particular, organisations' investment commitment to innovation may produce valuable outcomes, if the leaders know how knowledge sharing factors relate to firms' innovation capability.

The study provides empirical evidence of the socio-technical factors that have an influence on staff preferences concerning knowledge-sharing processes. Furthermore, the socio-technical factors (STF) (top management support (TMS), IS infrastructure (IS), interpersonal trust and reward systems (Rew)) that are statistically significant influence knowledge-sharing processes (KSP) (donation and collection). The findings show that TMS was effective in encouraging employees to both donate and collect knowledge with other colleagues. The findings indicate perceptions of TMS and that encouragement of knowledge-sharing and providing the best environment for this positively influenced employee willingness to share knowledge. Therefore, management should recognise this and implement more methods to promote knowledge-sharing activities, and they should adopt and facilitate a social interaction culture in order to motivate their employees to share knowledge.

IS infrastructure shows a significantly positive relationship and correlation with knowledge donation but not significant with knowledge collection. Although the results of the analysis show that most respondents agreed that the use of various tools and technologies helps employees in sending knowledge, the results reveal no significant relationship between IS infrastructure and knowledge collection. This phenomenon maybe explained by the fact that organisations exhibit attractive systems to donate knowledge yet employees found it difficult to extract or recollect the experiences or the knowledge from these systems. The finding may also be caused by the fact that investing in the technology infrastructure is not enough to facilitate knowledge collection due to limitations and privilege regarding access limitations and possible sensitivity of the information and knowledge.

Interpersonal trust between co-workers shows a significantly positive correlation with knowledge donation from the perception that the trust relationship between staff is significant, and, therefore, staff members readily donate knowledge they know and acquire. Therefore, it confirms that having a strong trust relationship between co-workers will usually increase knowledge donating but not always. However, this variable is not significant with knowledge collection. This implies that organisations need to invest more time and effort in building the trust among staff to achieve strong results in knowledge-sharing. This effort will often lead to the best practice or business opportunities. However, fewer respondents agreed that staff should share personal information with their colleagues. This happens generally when a worker trusts the other workers inside the organisation and feels free to express feelings and perceptions, which can include knowledge and details that are not just work related. In addition, respondents' avoidance to share personal information should not negatively influence the KSP but was not strong enough to be significantly correlated to either knowledge donation or knowledge collection. This is because the work-related knowledge, which staff want to share, rather than individual knowledge.

The reward systems factor was weakly correlated with only the knowledge donation variable. Most of the respondents agreed that their organisations usually reward those who share new learned knowledge, but the result was not strong enough to show a strong or moderate correlation. The low level of correlation can be a reason that most of the organisations either do not reward for sharing knowledge or do not have a clear policy or rule in their organisation concerning knowledge-sharing. Generally, staff in any organisation should recognise rewards as actions for desired behaviours and feel acknowledged by senior management.

Hypothesis H2a, which represents a relative advantage that positively influences KSP, was supported. However, H2b and H2c results show that compatibility and complexity have no significant

relationship with KSP in terms of donating and collecting knowledge. The DOI model provides an understanding of how the DOI process works as a result of the four elements: an innovation; communication channels through which the idea is communicated; the time required for this communication process; and the members of a social system between whom the communication takes place [23]. Rogers [23] finds that the time taken for this diffusion depends on the nature of the adopters, which are categorised as innovators, early adopters, early majority, late majority, and stragglers, respectively. Innovations with higher relative advantage are amenable to be trialed and have compatibility and complexity that will be adopted sooner than those with contrary features [23].

Regarding the Saudi organisational innovation capability, the impact of a firm's innovation capability was found to be strongly positively associated with employee enthusiasm to sharing knowledge (such as donation and collection of knowledge). The relationship analysis showed that KSP has a mediating role on the OIC construct via the STF construct; hence, H3 is strongly supported. This result indicates that OIC is significantly moderately correlated and suggests that innovation involves enabled knowledge-sharing by socio-technical factors which lead to generating new ideas, creative operating points, the advancement of new processes, services and products and raising the level of the computation between organisations in certain industries or sectors. Therefore, changes introduced by organisations should involve a broad integration of the knowledge-sharing practices that attempt to encourage innovation, such as the allocation of a budget for providing adequate training for knowledge-sharing, the linking of staff to the generation of new ideas or the creation of teams systematically devoted to smoothly adopting new knowledge-based initiatives.

6.1. Study Implications

It is very important to understand and assess the existence of important factors that influence knowledge-sharing toward adopting innovation capable organisations that will contribute to any country welfare. The current study developed a measurement model that can understand the socio-technical factors that most effectively positively influence or enable knowledge-sharing towards organisational innovation capability in Saudi firms. The following remarks summarizes the research implications of the current research:

- Top management facilitation of knowledge-sharing is important to enable a firm with the superior competence in knowledge-sharing that will allow them to succeed in innovation performance.
- Reliance on only a techno-centric approach to knowledge-sharing is insufficient for achieving the social relationships and interpersonal communications between employees that is necessary to motivate employee willingness to share knowledge. Therefore, all transitional elements, top management support, and technology use should always be considered together when promoting knowledge-sharing initiatives towards innovation capability.
- Reinforcing trust between coworkers through arranging social events and outdoor discussions occasionally is vital. Such events could play an important role in helping staff overcome work stress through building informal friendships.
- Increasing the knowledge sharing between organisational levels enables easier vertical information flow.

6.2. Limitations for Future Research

The current study has used a survey research approach. However, as with all studies, the findings should be understood in the knowledge of the limitations that were faced by the researcher and research. The limitations of this study and recommendations for future research studies directions are listed below:

- The study focused on knowledge-sharing practices and innovation capability in selected organisations in Saudi Arabia. It addressed the extent to which the knowledge-sharing factors from a socio-technical perspective influence the preferences of staff to share knowledge on

increasing the ability of organisations to be innovative. However, due to time and financial restrictions, no comparative study was undertaken for any other similar or different context in other developing or developed country. Therefore, further research is recommended in this area.

- The data analysis of the current study shows a demand for deeper research at the organisational level. Further investigations are needed to examine the differences between staff roles with respect to innovation initiative experiences, such as policymakers, strategic managers, and IT experts. The outcome would provide a further understanding of this study's main concepts.

7. Conclusions

This study was conducted to provide a theoretical progression in the area of knowledge-sharing and innovations together, as well as to identify practical contributions for the management of knowledge within Saudi Arabia from organisational prospective. The study provides empirical evidence of the socio-technical factors have an influence on staff preferences concerning knowledge-sharing processes. Furthermore, the socio-technical factors (STF) (top management support, IS infrastructure, interpersonal trust and reward systems) that are statistically significant influence on knowledge-sharing processes (KSP) (donation and collection). In conclusion, the relationships among knowledge-sharing enablers, processes, and firm innovation capability provide information regarding how Saudi firms can promote knowledge-sharing culture to sustain their innovation performance.

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Appendix A

Table A1. Survey Items.

Top Management Support (TMS)	
TMS1	The top management level thinks that encouraging sharing knowledge with colleagues is very important.
TMS2	Top managers always encourage and support staff to share their knowledge with other colleagues.
TMS3	Top management level provides most of the necessary environment, help and resources to help the staff to share their knowledge with other staff.
TMS4	Top managers are keen to see that the staff are happy to share their knowledge with colleagues.
IS infrastructure	
IS1	My company provides various tools and technologies to facilitate knowledge-sharing and exchange experiences (e.g., email, intranet and groupware).
IS2	Employees use expensive electronic storages to access data/information/knowledge (such as online databases and knowledge bases).
IS3	The technological tools available attract the staff to collaborate by sharing their knowledge.
Interpersonal Trust (Trust)	
Trust1	I don't hesitate to share my feelings and point of views with my colleagues.

Table A1. *Cont.*

Trust2	I believe co-workers should not share personal information.
Trust3	Our company maintains certain rules and procedures to protect the employees from sharing their knowledge with harmful intentions towards others.
Trust4	In our company, a considerable level of trust exists between co-workers.
Trust5	Most of my colleagues are people whom I know and thus consider trustworthy.
Rewards System (Rew)	
REW1	Our company rewards employees for sharing knowledge experience with their colleagues.
REW2	The knowledge-sharing rewards available are effective in motivating staff to spread their knowledge.
Perceived Relative Advantages: "In my organisation, I believe sharing knowledge with colleagues will..."	
RA1	Increase solving-problem capability.
RA2	Improve team worker performance.
RA3	Allow quick reaction to new information about the industry or market.
RA4	Assist with being effective in their jobs.
Perceived Compatibility: "In my organisation, I believe sharing knowledge with colleagues ..."	
COM1	Is compatible with the organisational situation.
COM2	Does not contradict the organisational policies.
COM3	Fit their work style.
Perceived Complexity: "Application of knowledge-sharing by my organisation will lead difficulties in..."	
COX1	Building employee commitment to the organisation
COX2	Controlling work quality
COX3	Support learning processes
Knowledge-sharing processes (Donation and Collection)	
DON1	I often share with my colleagues the new working skills that I learn.
DON2	My colleagues often share with me the new working skills that they learn.
DON3	I often share with my colleagues the new information I acquire.
DON4	My colleagues often share with me the new information they acquire.
DON5	Sharing knowledge with my colleagues is regarded as something normal in my company.
COL1	My colleagues often share with me the working skills they know when I ask them.
COL2	I often share with my colleagues the working skills I know when they ask me.
COL3	My colleagues often share with me the information they know when I ask them.
COL4	I often share with my colleagues the information I know when they ask me.
COL5	Our company staff often exchanges knowledge of working skills and information.

Table A2. Dependent Factor.

	Organisation Innovation Capability
OIC1	Our company frequently tries out new ideas.
OIC2	Our company seeks new ways of doing things.
OIC3	Our company is creative in its operating methods.
OIC4	Our company is frequently the first to market new products and services.
OIC5	Innovation is perceived as too risky in our company and is resisted.
OIC6	Our new product/service introduction has increased during the last five years.
OIC7	Our company often develops new products/services that are well accepted by the market.
OIC8	The new products or services developed by our company always arouse imitation from competitors.

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