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# The Relationships between Technological Support, Incentives, Knowledge Sharing and Product Innovation in the Iraqi Textile Industry

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**Abstract-** *This study addresses the lack of evidence from previous studies on the relationships between technological support, incentives, and product innovation, and whether knowledge sharing has a mediating effect on these relationships particularly in the Iraqi textile industry. Based on the survey among 351 employees in the Iraqi textile industry, the present study empirically tested the hypotheses using structural equation modelling. The results show that technological support and incentives positively and significantly influence knowledge sharing. Knowledge sharing was also found to be an important mediator between technological support and incentives with product innovation. The findings bear implications to the Iraqi government's call for innovation in the Iraqi textile industry.*

**Keywords-** *Technological Support; Incentives; Knowledge Sharing; Product Innovation.*

## 1. INTRODUCTION

In today's global and dynamic competitive environment, product innovation is becoming more and more relevant, mainly as a result of three major trends: intense international competition, fragmented and demanding markets, and diverse and rapidly changing technologies (Wheelwright and Clark, 1992). Firms that offer products that are adapted to the needs and want of target customers and that market them faster and more efficiently than their competitors are in a better position to create a sustainable competitive advantage (Prahalad and Hamel, 1990; Amit and Schoemaker, 1993; Nonaka and Takeuchi, 1995).

The present study was motivated by a recent call from the Iraqi government for innovation (Mohamed, 2009) in the textile industry which comprises 6 government-owned manufacturers running 20 textile factories. The present researchers conducted preliminary interviews with the manufacturers and were informed that they were still using traditional technology and focused on production of existing products. Further, the factories were wrought with low salary, lack of incentives, and the operations were lacking in technological support and knowledge sharing (Al-Hamdani, 2006).

Given that knowledge sharing and product innovation are relatively new concepts in the Iraqi textile industry, the presents study seeks to explore factors that influence product innovation. Bartel, Ichniowski and Shaw (2007) explained that investment in new information technology in a manufacturing firm will have a valuable effect, such as increasing productivity growth and product innovation. Product innovation consists of successfully exploiting new knowledge (Myers and Marquis, 1969). Product innovation can utilize new knowledge or technologies, or can be based on new uses or combinations of existing knowledge or technologies.

Lee, Kim and Han (2010) categorized the factors influencing knowledge sharing into three types, namely personal factor, organizational factor, and technical factor. Knowledge sharing plays a potential mediating role in connecting technological support and incentives with organizational innovation product. Successful knowledge sharing is believed to have the potential of enhancing an organization's competitive advantage, customer focus, employee relations and development, innovation, and lower costs.

Therefore, this paper examines the mediating effect of knowledge sharing on the relationship between organizational factors (technological support and incentives) with product innovation in the Iraqi textile industry.

## 2. THEORETICAL BACKGROUND

### 2.1 Product Innovation

Product innovation is one of the key factors that contribute to success of an organization. New product development and product innovation is an important strategy for increasing the market share and performance of the business. Studies have shown that new product

development has positive impact on the performance of the firm (Hassan, Shaukat, Nawaz and Naz, 2013).

Product innovation, also known as product development, is a systematic work process, drawing upon existing knowledge gained from research and practical experiences directed towards the production of new materials, products and devices, including prototypes (Hage & Hollingsworth, 2000). According to Alegre, Lapiedra, and Chiva (2006), product innovation is a process that includes the technical design, R&D, manufacturing, management and commercial activities involved in the marketing of a new (or improved) product.

Product innovation has many dimensions. First, from the perspective of the customer, product is new to the customers. Second, from the perspective of the firm, the product is new to the firm. Third, product modification means brining product variation in the existing products of the firm (Atuahene-Gima, 1996). Firms conduct product innovation to bring efficiency in the business (Polder Van Leeuwen, Mohnen & Raymond, 2010). Thus, product innovation aims to present a new or improved product or service for the customers and customers see the impact of such innovation in the products or services they receive (Rowley, Baregheh and Sambrook, 2011).

## 2.2 Technological Support

Lang (2001) espoused the salient importance of deploying technology to successfully organize and share knowledge. Technology has always been a source of innovation and competitiveness (Makido, Kimura and Mourdoukoutas, 2003). Sher and Lee (2004) indicated technology is certainly conceptually complicated and multi-dimensional. It exists in several types which include artifact, knowledge, and process. Artifact technology can relate like tools, techniques, and actions used to change organizational inputs into outputs. With strong KM technology support, public organizations are likely to be able to capture, share, apply, and create knowledge more efficiently and effectively (Gold, Malhotra and Segars, 2001). Kling and Scacchi (1982) suggest that IT artifact may be a central element, but it is only one element in a "package" that also includes components required to apply that technical artifact to some socioeconomic activity. Kling and Scacchi further develop this ensemble view to include the commitments, additional resources such as training, skilled staff, and support services, and the development of organizational arrangements, policies, and incentives to enable the effective management and use of new technologies. As a result, they argue that worker skills in IT should improve simultaneously. Lee and Choi (2003) and Kim and Lee (2005) argued that knowledge management (KM) technology support refers to the availability of information and communication technology to facilitate storage, retrieval, and sharing of knowledge.

Technology tools for knowledge sharing include electronic bulletin boards, discussion forums, knowledge directories, groupware, databases, intranets, intelligent search engines, personal web pages, electronic mail, virtual conference rooms, libraries, corporate yellow pages, among many others (Alavi and Leidner, 2001; Bender and Fish, 2000). It is evident that technology enables and aids core knowledge activities such as knowledge creation, knowledge sharing, knowledge distribution, and knowledge application (Gold et al., 2001). Similarly, it is clear that technology is an integral part of the KM application. Specific technologies play a fundamental role in promoting the KM movement (Barney, 1991). Kharabsheh (2007) draws a very clear relationship between technology and knowledge sharing. Therefore, it is posited that:

H1: Technological support relates positively to knowledge sharing.

H2: Technological support relates positively to product innovation.

## 2.3 Incentives

Incentives are powerful attractions for employees. However, the effectiveness of the incentives can be fully realized only when system services themselves are useful (Lee, Lee & Kwon, 2005). According to Meng and Gallagher (2012), the proper use of incentives has a direct effect on project performance and can boost the motivation of the employees to work harder and produce more innovative solutions. Nevertheless, used unwisely and ineffectively, it can have the opposite effect. So, incentives should be planned such that “workers are motivated and rewarded for taking the time to generate new knowledge (i.e. learn), share their knowledge and help others” within and outside their own organizational groups (Gold et al., 2001). Specifically, providing rewards and incentives and including support for KM as part of performance assessment will positively influence the desired behavior of knowledge workers (Bock, Zmud, Kim & Lee, 2005). Kankanhalli, Tan and Wei (2005) suggest that organizational incentives such as promotion, bonus, and higher salary have been shown to be positively related to the frequency of knowledge contribution made to KMSs especially when employees identify with the organization. This is in accordance with Cabrera, Collins and Salgado (2006) and Kulkarni, Ravindran and Freeze (2007) who argue employees who perceive a higher level of incentives to share and use knowledge are more likely to report that the content of KMS is useful. Incentives including recognition and rewards have been recommended as interventions to facilitate knowledge sharing and help build a supportive culture (e.g., Hansen, Nohria & Tierney, 1999; Liebowitz, 2003). Moreover, a vital part of knowledge sharing is determining what type of incentives can be used to improve individuals’ willingness to share knowledge (Bartol & Srivastava, 2002). Moreover, incentives and rewards (even if they are nonmonetary) are a necessary condition behind KM success. Organizations must take note that incentives and rewards are required both to stimulate sharing of knowledge (in the form of "high-quality" content) and use of the shared knowledge. in addition to the KM system, the development of

organizational arrangements, policies, processes, and incentives to enable the effective management and use of the technology or KM (Kulkarni, Ravindran & Freeze, 2007). Therefore, it is posited that:

H3: Incentives relate positively to knowledge sharing.

H4: Incentives relate positively to product innovation.

## 3. KNOWLEDGE SHARING AND PRODUCT INNOVATION

Hooff and Van Weenen (2004) found knowledge sharing was an important process in modern organizations, since successful knowledge sharing can result in shared intellectual capital, which is absolutely important resource in today's K-economy. Therefore, knowledge sharing and diffusion are both essential in order to create new knowledge and product innovation. Gupta and Govindarajan (2000) performed a review of several studies on knowledge sharing and concluded that practicing knowledge sharing (KS) results in improvement of organizational effectiveness. The outcome of knowledge sharing is the creation of new knowledge and innovation that will improve an organization's performance (Al-Hawamdeh, 2003). Lam and Lambermont-Ford (2010) illustrated that knowledge sharing is a key process in transforming individual learning into organizational capability. Knowledge sharing behavior is thus positively related to a firm's innovation and competitive advantage (Liao, 2006). Knowledge sharing can be viewed as an organizational innovation (Lin and Lee, 2006), owning to its fundamental role in generating new ideas and developing new business opportunities through the socialization and learning process of knowledge workers. Nonaka (1991) and Nonaka and Takeuchi (1995) contend that the concept of innovation and "knowledge creation" are closely related. Along this line, it is generally assumed that the process of innovation consists of an ongoing pursuit of harnessing new and unique knowledge (Subramaniam and Youndt, 2005). Hence, it is posited that:

H5: Knowledge sharing relates positively to product innovation.

## 4. MEDIATING ROLE OF KNOWLEDGE SHARING

Knowledge sharing in organizations is of great interest to researcher and practitioner alike. Both report that knowledge sharing improves organizational performance (Lesser & Storck, 2001), promoting competitive advantage (Argote & Ingram, 2000), innovation (Powell, Koput, & Smith-Doerr, 1996) and even survival (Baum & Ingram, 1998). Dyer and Nobeoka (2000) indicated that knowledge sharing could be defined as the activities of how to help communities of people work together, facilitating the exchange of their knowledge, enabling learning oriented, and increasing their ability to achieve individual and organizational goals. The best knowledge sharing report that people frequently seek information and insights outside their immediate workgroup or team and their brightest people are generally their highest contributors (McDermott & O'Dell, 2001). Knowledge sharing can be viewed as an organizational innovation (Darroch & McNaughton, 2002), owning to its fundamental role in generating new ideas and developing new business opportunities through the socialization and learning process of knowledge workers. The organizational promotion of knowledge sharing is changing traditional ideas about managing intellectual resources and employee work styles by providing new processes, disciplines and cultures, thus constituting an organizational innovation (Darroch & McNaughton, 2002). The knowledge sharing process enables the flow of knowledge among and between individuals, groups and organizations. The heart of knowledge is a community of shared ideas (Lang, 2001). Therefore, it is posited that:

H6: Knowledge sharing mediates the relationship between technological support and product innovation.

H7: Knowledge sharing mediates the relationship between incentives and product innovation.

## 5. PROPOSED RESEARCH MODEL

The research framework of the present study is developed based on RBV and KBV theories. The resource-based view of the firm (RBV) discusses the nature of resources possessed by organizations and details the qualities that such resources must maintain in order to be converted into sustainable competitive advantages over time (Barney, 1991; Wernerfelt, 1984). Advocates of this theory propose that an organizational resource must be valuable, rare, imperfectly tradable, and inimitable, in order to provide the firm with a sustainable competitive advantage (Barney, 1991; Markides and Williamson, 1996). In addition, the organization must possess the ability to effectively and efficiently exploit the full potential of its resources, in order to develop and maintain any potential competitive advantages (Barney, 1997). Knowledge-based view (KBV) researchers increasingly have paid attention to incentives in realizing the innovation-related activities, where effort and learning have a high degree of complementarity (Coff, 2003).

The essential notion of the RBV is that all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm enable the firm to implement strategies that improve its efficiency and effectiveness (Barney & Clark, 2007). Thus, Spender (1989: 185) defines "the organization as, in essence, a body of knowledge about the organization's circumstances, resources, causal mechanisms, objectives, attitudes, policies. If production creation requires the integration of each person's knowledge with that of others, even if knowledge acquisition is individualistic, the firm provides necessary incentives and direction" (Spender, 1992). In summary, according to the resource-based view, a firm that possesses and succeed in exploiting its resources with the characteristics discussed earlier can maintain a

sustainable competitive advantage and perform at a higher level than the industry average (Barney & Clark, 2007). A firm's competitive advantage comes from the coordination and combination of different knowledge resources at the firm level rather than the individual level through business activities (Spender, 1996).

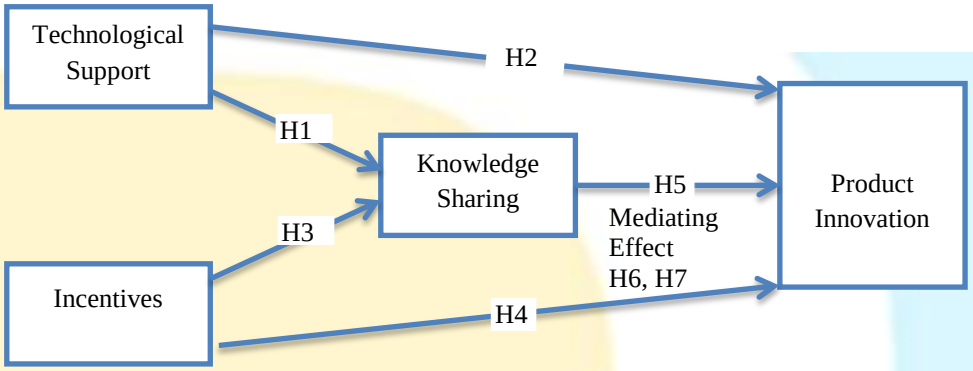


**Fig 1: Research Model**

## 6. METHODOLOGY

Based on proportionate stratified random sampling technique, questionnaires were randomly distributed among 361 employees of the Iraqi textile from March to June 2013. Only 350 of the 360 questionnaires were complete and used for Structural Equation Model (SEM) analysis. Survey items were adapted from existing instruments used in past research. For the present study, there are 33 items on a five-point Likert scale were used to measure responses. The 11 items of the technological support were adapted from (Gold et al., 2001), the five items of incentives measurement were adapted from (Cho, 2011). Measures of knowledge sharing were adapted on 11 items from Casimir, Lee and Loon (2012), Seba, Rowley and Lambert, (2012). Finally, the six items of product innovation measurement were adapted from Hung, Lien, Yang, Wu and Kuo (2011).

## 7. DATA ANALYSIS

Results from the confirmatory factor analysis demonstrated that all of the scales used in the study formed adequate measurement models and thus provided evidences for the construct validity of the measures. Table 1 shows the fit indices of the measurement models whereas Table 2 shows the descriptive statistics of the constructs.

**Table 1. Evaluation of Measurement Models**

| Variables | $\chi 2$ | df | P | CFI | GFI | CMIN/df | RMSEA |
|---|---|---|---|---|---|---|---|
| Technological support (TS) | 8.64 | 6 | .10 | .99 | .99 | 1.44 | .035 |
| Incentives (IN) | 5.18 | 4 | .27 | .994 | .999 | 1.29 | .029 |
| Knowledge Sharing (KS) | 5.2 | 4 | .21 | .99 | .99 | 1.3 | .029 |
| Product Innovation (PI) | 16.85 | 6 | .01 | .991 | .985 | 2.81 | .072 |

**Table 2. Descriptive Statistics (N=351)**

| Constructs | Mean | Std. Deviation | TS | IN | KS | PI | CR | AVE |
|---|---|---|---|---|---|---|---|---|
| Technological support (TS) | 46.52 | 7.06 | 1 | | | | 75 | 83 |
| Incentives (IN) | 16.66 | 4.22 | .541** | 1 | | | 81 | 88 |
| Knowledge Sharing (KS) | 42.41 | 5.65 | .567** | .545** | 1 | | 81 | 88 |
| Product Innovation (PI) | 19.39 | 4.82 | .552** | .497** | .486** | 1 | 68 | 77 |

Note: ** Correlation is significant at the .01 level (2-tailed), CR: Composite Reliability, AVE: Square Root of AVE.

The goodness of fit indices show that the hypothesized model fit the data well .The path coefficients in Figure 2 and Table 3 was used in testing hypotheses 1 to 5, the indirect effects between the variables were tested in hypotheses 6 and 7. Holbert and Stephenson (2003) indicated specific indirect effects are not calculated by the major SEM software packages, so Sobel test for significant indirect effects are shown in Table 4.

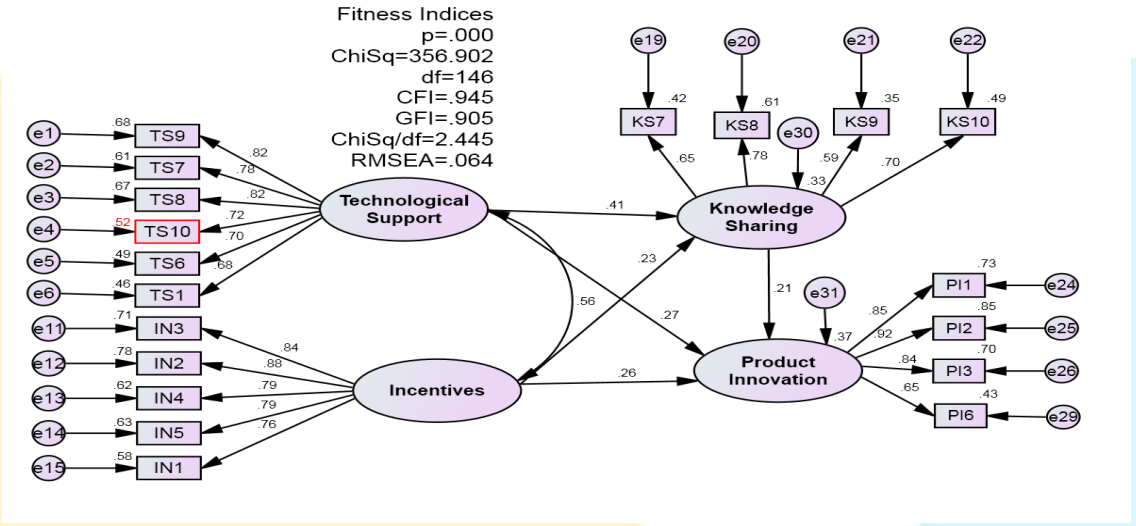


**Fig 2: Structural Model**

## 8. RESULTS

All of the hypotheses were examined through the investigation of the path coefficients and statistical significance. Based on the results in Table 3, Hypothesis 1 is supported. Based on the results in Tables 3 and 4, Hypothesis 2 is supported. There is a significant path coefficient of .41 ($p<.01$) from technological support to product innovation. Hypothesis 5 is supported from knowledge sharing to product innovation. From the results in Table 4, knowledge sharing was found to have partial mediating effect between technological support and product innovation, and between incentives and product innovation. So, hypotheses 6 and 7are partially supported.

**Table 3. Path Coefficients and Goodness-of-Fit**

| Path | Standard Path Coefficients (β) | C.R | P | Goodness-of-fit |
|---|---|---|---|---|
| TS→KS | .41 | 5.19 | *** | p =.000<br>DF= 146<br>CFI = .945<br>GFI = .905<br>CMIN/df = 2.445<br>$x^2$ = 356.902<br>RMSEA=.064 |
| TS→PI | .27 | 3.88 | *** | |
| IN→KS | .24 | 3.26 | .001 | |
| IN→PI | .26 | 4.09 | *** | |
| KS→PI | .21 | 2.99 | .003 | |

Note: β: Standard Path Coefficients; C.R.: Critical Ratio *: $p \leq .05$, ***: $p \leq .001$

**Table 4. Summary of Significant Indirect Effect of Variables**

| Predictor Variables | Product Innovation | | | | |
|---|---|---|---|---|---|
| | Direct Effect | H | Indirect Effect | H | Result |
| Technological Support | .27 | Sig. | .004 | Sig. | Partial mediation |
| Incentives | .26 | Sig. | .01 | Sig. | Partial mediation |

## 9. DISCUSSION

The present research demonstrates the importance of the technological support and incentives measures that enable knowledge sharing and to enhance product innovation. Consequently, present study contributed to the previous studies through proposed a theoretical framework, which based on both of RBV and KBV based theories. The framework is able to explain the direct relationship between technological support and incentives and product innovation and indirect relationship between technological support and incentives through the intervening role of knowledge sharing.

This study bears theoretical implications as it provide some insights in integrating the resource-based view when applied in the Iraqi textile industry. It reveals that whereas the resources (knowledge) in the textile factories may be hierarchical (organizational structure), knowledge sharing may bring the factories one step closer towards organizational effectiveness (product innovation) by mediating the resources to product innovation. Further exploration is needed to examine this proposition. The social implication of this study for the Iraqi government which owns the factories is to enhance knowledge sharing activities in the factories in order to promote product innovation in the Iraqi textile industry. The findings bear practical implications to the Iraqi government's call for innovation and knowledge management practices in the Iraqi textile industry. Incentives and rewards (even if they are nonmonetary) are a necessary condition behind KM success. Organizations must take note that incentives and re- wards are required both to stimulate sharing of knowledge (in the form of "high- quality" content) and use of the shared knowledge.

One of the limitations of this study is that the study was done in one industry and in one middle-eastern country, specifically in the Iraqi textile industries which limits generalizability of the findings. To further test the organizational contexts of the model, future research are encouraged in the context of an Asian or developing countries or emerging economies from which the measurement model was tested (Gold et al., 2001; Wong, 2005). The study can also be replicated in other industries as well as in public or private factories.

## 10. CONCLUSION

The present research shows the importance of the technological support and incentives measures that enable knowledge sharing to enhance product innovation. Consequently, the present study can contribute to the previous studies through the proposed theoretical framework. Based on both the RBV and KBV, this framework was able to explain the direct relationship between technological support and incentives and product innovation and indirect relationship between technological support and incentives through knowledge sharing. The findings bear implications to the Iraqi government's call for innovation and knowledge management practices in the Iraqi textile industry. Organizations must take note that incentives and rewards are required both to stimulate sharing of knowledge and use of the shared knowledge.

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