

Knowledge Sharing Practices as a Basis of Product Innovation: A Case of Higher Education in Iraq

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Abstract—Knowledge is recognised the most significant resource for competitive advantage and the key to enhancing innovation. Knowledge sharing (KS) is considered to be a building block of efficient performance within higher education environments and to play a key role in enhancing the innovation of universities. The aim of this paper is to explore the effect of knowledge sharing on product innovation in Iraqi public higher education institutions. Structural equation modelling (SEM) with AMOS 20 was used, the results found that knowledge sharing play a pivotal role in enhancing product innovation within higher education environment.

Index Terms—Knowledge sharing, product innovation, higher education, Iraq.

I. INTRODUCTION

Higher education sector today are facing global challenges from a dynamic environment characterised by rapid technological change. Academic institutions need to develop their abilities and respond to these demands like business organisations [1]. As the world increasingly moves towards competition, knowledge and sharing it is recognised the most significant resource for competitive advantage [2] and the key to enhancing innovation. It increases the effectiveness of the organisation, and its creativity by converting the tacit knowledge embedded in individuals into explicit knowledge through interaction [3]. It is argued that through KS, individuals can improve their capacity to solve unstructured and complicated problems, reduce their mistakes, and increase their learning [4].

Higher education in developing countries like Iraq is facing rapidly changing challenges that require innovation [5]. Educational markets are becoming increasingly global nowadays, and the ability of the education system in Iraq to reach a global market will depend on changes in the systems, methods, and curricula. Within higher education environments, KS is known to be a building block of efficient performance and to play a key role in enhancing the innovation of universities [6]. It is thought to be the foundation of learning and research at universities and a vital pillar of knowledge management (KM) that is critical to academic innovation.

Researchers have acknowledge the relationship between KS and innovation [7], [8], but few touch on knowledge processes (donating and collecting) and their impact on teaching staff's product innovation within developing

countries like Iraq. Innovation is important for organisations including learning institutions such as universities, thus, this research aims to explore the impact of knowledge sharing processes namely donating and collecting on product innovation using the context of public Iraqi higher education institutions (HEIs).

II. KNOWLEDGE SHARING AND INNOVATION

Today's organisations are increasingly focusing on innovation as a key factor in success and competitive advantage. Innovative organisations are able to adapt and respond to rapid an unstable environment and technological changes and survive in the present environment [9]. Innovation can be understood as developing, generating, adopting, and implementing new ideas, methods, programmes, and policies so as to achieve the goals of an organisation effectively. Chen et al. [10] noted that product innovation has the ability to improve production and distribution processes. It is one of the critical success factors for organisational growth and increased profits [11].

Rogers [12] asserted that educational institutions were a way to adopt and apply innovation. Educational quality is reliant on product being adaptive to the changing environment. Therefore, it is necessary to study this type of innovation within the higher education (HE) environment. This research defines innovation as "accepting, developing, and implementing new products such as courses, research projects, teaching materials, and curricula.

In the KM literature, past research reported different types for knowledge (K), but the most commonly used are tacit and explicit knowledge. Tacit knowledge describes the personal, the subjective, and the intangible. It is embedded in the minds of people, is accumulated through learning, and experiences, and developed through conversations, workshops, job training, and social interaction. In contrast to tacit knowledge, explicit knowledge denotes knowledge that is articulated, objective, externalised and captured, and has a more tangible format [13].

KM involves the creating, sharing and using of knowledge [7]. It has been noted that, when considering the application of KM initiatives, it is important to create a culture of KS [14]. KS includes activities in which information, skills, insights are exchanged among organisational members [15].

It is defined as a two-dimensional process, with members of staff sharing and exchanging their tacit and explicit knowledge. Daily interaction creates new knowledge through the process of knowledge exchange, donation, and collection [16].

Access to knowledge may help organisational members to

Manuscript received October 11, 2013; revised December 15, 2013.

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come up with new ways to solve problems and engage in further innovative activities. Innovation depends on employees' knowledge, skills, and experiences in value creation [17]. The knowledge-based view suggests that organisations need to exhibit knowledge creation but more importantly KS [18]. Since knowledge is embedded in individuals, it is necessary for it to be shared among organisational members so that they can establish new routines and mental processes that may help them to solve their problems [2]. When organisational members share their tacit knowledge and convert it into explicit knowledge through collecting and donating, collective learning is generated, which in turn improves the stock of knowledge available to the organisation. It is argued that organisations that promote a KS culture among organisational members are likely to generate new ideas that lead to product innovation [2], [19].

Previous studies have reported that KS is a basis of product innovation. For instance, Wei and Xie [20] found that KM could improve innovation performance within industrial companies in China. Similarly, Kamasak and Bulutlar [21] demonstrated that knowledge collecting had more effect on exploitative and explorative innovation inside and outside departments than did donating knowledge in the context of industrial companies in Turkey. Zaqout and Abbas [8] pointed out that explicit and tacit knowledge act as a bridge between trust, social networks, information and communication technologies, and performance within Malaysian public universities.

Although previous studies have established the relationship between KS and innovation, few touches on knowledge processes and their impact on the teaching staff's product innovation, there is a need for research understanding the practical difficulties of KS for product innovation [22] within developing countries and particularly the Iraqi environment, therefore, this research proposes the following:

- 1) H1: Knowledge donating will positively affect product innovation in Iraq's public HEIs.
- 2) H2: Knowledge collecting will positively affect product innovation in Iraq's public HEIs.

III. METHOD

The research used a quantitative approach to examine the effects of knowledge donating and collecting on product innovation. Eight items were developed from Hooff and Weenen [16] to measure KS reflecting the exchange of teaching-related knowledge, experience, and skills among teaching staff, and four items measured product innovation were drawn from [23] and [24]. These referred to the degree to which members of staff accepted, developed, and implemented new products such as courses, research projects, teaching materials and curricula. A self-administered questionnaire was developed, using five-point Likert scales ranging from 1-strongly disagree to 5-strongly agree. The questionnaire was translated into Arabic using the translation back-translation procedure. 400 questionnaires were sent to eight public colleges using the delivery and collection method, of which 240 were returned and usable for analysis.

IV. RESULTS

SEM with AMOS 20 was used to test the causal relationship between knowledge donating and collecting, and product innovation. SEM consists of two steps: a measurement model to evaluate the convergent validity of the constructs, and a structural model to test and evaluate the causal relationships among factors. The three factors are evaluated through confirmatory factor analysis (CFA). The convergent validity was tested by investigating significant factor loadings of 0.5 or higher [25]. Additionally, the average variance extracted (AVE) measure was used, which should be 0.5 or higher [26]. Reliability was assessed separately for each dimension included in the model, based on the Cronbach's alphas and composite reliability (CR), each of which should exceed 0.7 [25]. The results shown in Table II indicate that the convergent validity and internal reliability were satisfactory. All factor loadings, and the CR and AVE were acceptable and significant.

TABLE I: VALIDITY AND RELIABILITY OF THE MODEL

Factor	Code	Loading	α	AVE	CR
Knowledge donating	KD1	0.800	0.81	0.70	0.82
	KD2	0.840			
	KD3	0.770			
	KD4	0.768			
Knowledge collecting	KC5	0.775	0.87	0.73	0.88
	KC6	0.890			
	KC7	0.850			
	KC8	0.840			
Product Innovation	PI9	0.818	0.83	0.72	0.83
	PI10	0.731			
	PI11	0.880			
	PI12	0.778			

Note: AVE = average variance extracted, CR = composite reliability, α = Cronbach's alpha, N= 240.

Discriminant validity was assessed using the criteria established by Fornell and Larcker [26]. According to them, the AVE should be greater than the squared correlations between two constructs. The constructs for all of the data were found to be empirically distinct and the discriminant validity was statistically confirmed. Table II displays the means and standard deviations. Additionally, it shows that the variances extracted from the constructs were greater than all of the squared correlations between items.

TABLE II: THE DESCRIPTIVE ANALYSIS AND DISCRIMINANT VALIDITY

Factor	Mean	SD	1	2	3
1-K donating	3.41	0.88	0.70		
2-K collecting	3.57	0.87	0.23	0.73	
3-Product	3.24	0.86	0.27	0.29	0.72

Note: SD = standard deviation, N=240

TABLE III: THE FIT INDICES OF THE MODEL

Fit indices	KS	Product Innovation	Target
χ^2/df	1.342	1.715	$\leq 2-5$
CFI	0.973	0.963	≥ 0.90
NFI	0.954	0.950	≥ 0.90
TLI	0.975	0.968	≥ 0.90
RMSEA	0.042	0.035	$< 0.05 - 0.08$

The research used also the fitness of fit indices for evaluating the measurement model as shown in Table III.

This including χ^2 , χ^2/df , the goodness-of-fit index (GFI), and the root mean square error of approximation (RMSEA), and incremental fit measurement, which includes a normed fit index (NFI), and a comparative fit index (CFI) [25].

To test the structural model the results from SEM show that the goodness-of-fit indices indicate adequate levels of fit for the model (see Table III and Fig. 1). H1 is concerned with the effect of knowledge donating on product innovation. The path coefficients were confirmatory at level 0.644 and significance shown by $p < 0.05$, indicating that H1 is supported.

H2 is concerned with the effect of knowledge collecting on product innovation. Table IV shows effective size of 0.687, thus H2 is confirmed.

TABLE IV: THE STRUCTURAL ANALYSIS OF THE MODEL

Hypothesis	Independent	dependent	Estimate
H1	Knowledge donating	Product	0.644**
H2	Knowledge collecting	Product	0.687*
H1, H2	Knowledge sharing	Product innovation	0.6399**
Fit indices	$\chi^2/df=1.262$, RMSEA=0.032, NFI=0.938, CFI=0.957, TLI=0.947		

Note: $p^* < 0.05$, $p^{**} < 0.01$

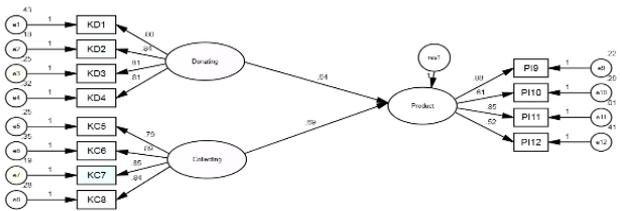


Fig. 1. Results of SEM

V. DISCUSSION

KS processes were found in this paper to be positively related to product innovation in Iraqi HE. Knowledge is a valuable resource of organisations [2], [13]. The role of knowledge and sharing it has emerged as an important area in the investigation of innovation in organisations. Product innovation is enhanced when organisational members exchange information, insights, skills, lessons learned, and experiences [17]. The knowledge-based view suggests that organisations need to generate as well as share knowledge [13], [27]. When knowledge is used, learning takes place which in turn leads to changes of behaviour and innovation [2], [28].

Supar [29] noted that the encouragement and practising of KS activities among teaching staff can enhance performance and create opportunities for innovation. The results of this paper demonstrate that the members of staff surveyed in Iraqi public HEIs are willing to donate and collect their skills, insights, experiences, expertise, information and notes both inside and outside of their own departments, which enables their universities to improve their product e.g. research and projects with other sectors, new courses, and curricula. The findings are congruent with Ferraresi *et al.* [30], who argued that KM processes, namely capturing, sharing, and application, can enhance innovation through the strategic

orientation of the organisation.

VI. CONCLUSION

This research aimed to examine the impact of knowledge sharing on product innovation. The results found that knowledge sharing is a basis of product innovation in Iraqi HE environment. This paper makes a theoretical contribution to the literature on KS and innovation, and provides support for the knowledge-based view theory and empirically strengthens the role KS plays in enhancing product innovation in Iraqi HEIs. These results give us a better understanding of how knowledge can lead to competitive advantage in HEIs. KS is known to transfer individual experiences, knowledge, skills, expertise, and information into explicit and organisational assets for better innovation. Managing knowledge and sharing it, as a strategic resource is one of the foundational weapons that enable universities to increase their competitive advantage and chances of survival. Therefore, the leaders in Iraqi universities need to expend effort and design strategies on promoting KS activities among their teaching staff such as sessions, conferences, workshops, etc. for better product innovation.

APPENDIX: QUESTIONNAIRE ITEMS

Construct	Item
Knowledge donating	Knowledge sharing with colleagues is considered normal thing in my department
	When they have learned something new, my colleagues within my department tell me about it
	When they have learned something new, colleagues outside of my department tell me about it.
	Knowledge sharing with colleagues is considered normal thing outside of my department.
Knowledge collecting	I share any information I have with colleagues within my department when they ask for it.
	I share my skills with colleagues within my department when they ask me to.
	I share information I have with colleagues outside of my department, when they ask me to.
	Colleagues outside of my department tell me what they know when I ask them about it.
Product innovation	Our university is always delivering new courses for members of staff.
	Our university constantly emphasises development and doing research projects.
	Our university often develops teaching materials and methodologies.
	Our university is developing new training programmes for staff members.

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