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E-B Environment - Behaviour Proceedings Journal

ICIS2022Penang Pt2.0

https://fim.uitm.edu.my/index.php/research/conference/342-icis-2022

e-IPH e-International Publishing House Ltd., United Kingdom

5th International Conference on Information Science
Royale Chulan, Penang, Malaysia, 19-21 Sep 2022
Organised by Faculty of Information Management, UiTM, Malaysia

The Influence of Knowledge Management and Individual Absorptive Capacity towards Innovation Capability among Agricultural Researchers: A pilot study

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Abstract
Advancing research and development (R&D) aspects is one of the main approaches to deal with this critical issue in agricultural sectors. The purpose of this paper is to evaluate the instruments to comprehend the association between knowledge management, absorptive capacity, and innovation capability in Malaysia's agriculture R&D. Focusing on individual-level analysis, this study quantitatively assesses the validity and reliability of the instruments at the preliminary stage of before going into full-fledged research. Based on the content validity index (CVI), and pilot data value, the finalized instrument has been sufficiently analyzed to proceed into a larger-scale study.

Keywords: knowledge management, absorptive capacity, innovation capability

DOI https://doi.org/10.21834/e-bpj.v8iSI12.5023

1.0 Introduction

Research and Development (R&D) activity has played a critical role in today's knowledge-based economy. Simultaneously, technological advancement has been significantly valued as the main economic driver in developing a country's interests, from infrastructure development to policy framework. Since "knowledge-based economy" was first coined, professionals and academics have shifted to studying knowledge and its outcomes concerning innovation. The term knowledge-based economy refers to knowledge-intensive activities that increase technical or scientific understanding in the context of either products or services. As a result, the role of innovation as a by-product of R&D activities is now highly demanded. Additionally, this study area has evolved into a multidisciplinary one where scientific information can be formed.

Moreover, R&D work has been vital to Malaysia's success in its quest to diversify its economy away from reliance on agriculture and raw material imports towards a goal of becoming a knowledge-based economy. Malaysia has been able to make significant strides in this area. Concerning competitiveness, Malaysia has also been able to keep up with many industrialized nations due to the adoption of science and technology policies and major efforts to improve the infrastructure for research and development during the past three decades (Krishna, 2022). However, despite the country's objective to become a high-income knowledge-based economy driven by

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DOI: https://doi.org/10.21834/e-bpj.v8iSI12.5023

modern technology and innovative activities, agricultural sectors are still seen as the focus of government concerns, notably economic sustainability and food security.

Nevertheless, despite playing a vital role, agriculture has not gotten the attention it deserves. There are certain exceptions, such as during food crises (which many less fortunate countries have experienced), when food costs soar above expectations, and when food insecurity poses a threat on a local, regional, or international scale (Lakitan, 2018). Due to factors such as climate change, land degradation, and conversion, the limited ability of smallholder farmers to produce sufficient food supply, and an increase in the population, current challenges in boosting food production and preserving food security have become significantly more difficult. The issue has gotten worse twofold: first, Malaysia's R&D priorities are shifting from agricultural-based to industrial-oriented (Lakitan, 2018), and second, there is a growing gap between the smallholder farmers to absorb inputs and the agricultural technologies developed by research institutions (Mikhailov, 2019).

Despite the minimal impact of the food and agriculture sectors on economic growth compared to other bigger sectors like manufacturing or construction, no countries can completely ignore their contribution to world food production. Improving productivity is the only way to increase food production due to the declining availability and suitability of land, water, and climate. These actions will be prosperous only if necessary agricultural technology is affordable and suited for farmers can productivity be raised (Lakitan, 2018). Therefore, future agricultural technology should be relevant to smallholder farmers' demands and have the least possible adverse effects on the environment, starting with studies that researchers in research institutions and agencies have introduced.

To deal with the rapid growth of knowledge and improve the ability of agricultural researchers to innovate, knowledge management and absorptive capacity play a critical role in the broad application of technology and scientific advancement. Therefore, this paper aims to investigate the reliability and validity of the initial instruments for accessing researchers' knowledge management, absorptive capacity, and innovation capability for the wider study of related issues.

2.0 Literature Review

2.1 Knowledge Management

Knowledge Management (KM) best practices must be implemented with the aim of improving organizational effectiveness given the increasing trend toward knowledge-based economies and organizations (Mat Nor et al., 2020). Knowledge is power, according to a well-known proverb. This claim suggests that the secret to power lies in the control of knowledge (Abu-Rumman, 2021). Nevertheless, as empirically demonstrated by scholars and researchers, information's importance in improving individual and organizational performance is undeniable. In addition to concentrating on tangible material assets like labour or land ownership, as in the past, global economic shifts have compelled many businesses to focus on the growth of their intellectual capital in order to gain a sustainable competitive edge (Ologbo & Nor, 2015). The notion of knowledge management became more applicable by focusing on the knowledge value in today's economic environment rather than solely on never-ending philosophical disputes because today's knowledge-based economic environment significantly relies on knowledge assets to obtain lucrative results.

The essential components of an organization's knowledge management strategy and operations are typically carried out through a variety of actions that make up knowledge management as a process. From being a trendy subject, knowledge management has become the cornerstone of an organization's strategy and management procedures. In an organization, knowledge is transferred and managed across the network of employees using both manual and automated methods. Knowing which information could benefit the organization and making sure it is readily available to those who need it can be done by leveraging knowledge management (Abu-Rumman, 2021). Knowledge management needs to be regarded as a planned method for capturing, developing, and sharing information to enhance organizational learning and performance. Furthermore, as organizations can utilize knowledge management to accomplish short and long-term goals inside the organization, it can be seen as a manner of demonstrating organizational advancement. Knowledge management enables organizations to produce, preserve, and distribute tacit and explicit information by utilizing technology and other strategies.

2.2 Absorptive Capacity

As knowledge management derived from knowledge-based theory focused on internal knowledge as the main resource for an organization's performance, Cohen & Levinthal (1990) proposed the idea of absorptive capacity that is vital to increase the speed, magnitude, and frequency of innovation through the process of acquiring, assimilating, exploiting, and transforming the knowledge (Juknevičienė et al., 2018). Kedia & Bhagat first coined the role of absorptive capacity in explaining firm receptiveness to foreign technology in 1988 (Guercini & Lechner, 2023). Later, Cohen & Levinthal (1990) discussed the influential absorptive capacity concept that underpins most of the related fields today. Cohen & Levinthal established that the collective ability to leverage external knowledge to commercial ends is termed absorptive capacity (ACAP). Zahra & George (2002) further investigated the absorptive capacity idea by dividing the constructs into two main subsets, namely potential absorptive capacity (PACAP) and realized absorptive capacity (RACAP). However, the underlying mechanisms of ACAP are still unclear, despite the construct's popularity and widespread use in academic publications (Sun et al., 2019).

Existing literature appears that the role of persons in connection to the organization's ACAP has scarcely been discussed. The ability of an organization to absorb knowledge will depend on the absorptive capacity of its members, as Cohen & Levinthal (1990) established in their revolutionary study. Although the ACAP literature has emphasized the significance of its precursors, such as past knowledge and experience, at the individual level (Lowik et al., 2017), cognitive models (Zahra & George, 2002), and social networks (Stræte et. al., 2023), the effects of these antecedents have rarely been examined empirically (Tutida et al., 2020).

Thus, individual participation is crucial to enable the absorption of new external knowledge. People need to be motivated and competent to judge the viability of technological advancements in order to succeed with knowledge absorption. Processes that include absorption capacity can be difficult and frequently become stagnant after initial innovation. To make their organizations innovative, knowledge workers must each actively contribute to the absorption of environmental information (Cohen & Levinthal, 1990; Enkel et al., 2017).

Given the significance of the definition proposed by Zahra and George (2002), a closer look at each component is highly needed. It's crucial to consider that using all four factors is necessary to build a long-lasting competitive advantage. Additionally, Zahra and George (2002) distinguish between realized absorptive ability, which includes the transformation and exploitation of external knowledge, and potential absorptive capacity, which comprises the acquisition and assimilation of external knowledge.

The ability of the company to recognize and acquire outside knowledge that is essential to the firm's operations is referred to in the first part of the definition as the acquisition of external knowledge. The second idea is the assimilation of external knowledge, which refers to the procedures and methods utilized by the company to evaluate, comprehend, interpret, and process outside data. Leal-Rodríguez, Roldán, Ariza-Montes, & Leal-Millán (2014) views this potential absorptive capacity as the result of exhausted efforts to gather and recognize important unique knowledge from outside sources.

Another subset of absorptive capacity, realized absorptive capacity, or RACAP, includes knowledge transformation and exploitation (Zahra & George, 2002). This subgroup includes developing fresh insights and concepts based on the accumulation of prior knowledge as well as new information (Leal-Rodríguez et al., 2014). To put it more precisely, knowledge transformation refers to the capacity to develop and enhance practices that aid in producing new knowledge by adding or eliminating information or by implying comparable knowledge but from a different perspective (Zahra & George, 2002). Meanwhile, Cohen & Levinthal (1990) highlighted knowledge exploitation as the application component of knowledge.

2.3 Innovation Capability

Scholars differently interpret the definition of innovation. The first category, understandings of innovation from the point of view of the process, as widely operated in both academic and industrial fields, denoted that innovation is the process of generating new knowledge in order to enhance existing processes, services, or new products to facilitate the results of business enhancement. The same proposition also made by Ologbo & Nor (2015) defined innovation as the result of developing, accepting, and putting original ideas for organizational processes, goods, or services into practice. Several authors whereby interpret innovation from outcome perspectives. For instance, Cohen & Caner (2016) described innovation as turning unique organizational findings into marketable output. Likewise, innovation is a realized invention with economic potential for businesses through providing new value to their stakeholders. To address end-user needs, Shujahat et al. (2017) operationalized the innovation process as the introduction of new goods with usage or attributes aligned with problem-solving procedures. Owing to this, all scholars acknowledged knowledge's critical role in the innovation process.

While most of the theoretical and empirical development of the concept of absorptive capacity has occurred in the country, inter-organizational, and organizational levels of analysis, comparable propositions also operate at the individual level. The process of cultivating novel ideas for the organization's value enhancement in processes, routines, or practices can be summed up as innovation at the organizational level. Like organizational-level innovation capability, individual-level innovation capability is characterized by behavior and personality traits that can improve organizational innovation (Kang & Lee, 2017; Saunila, 2014). Thus, in order to improve the organizational innovation level, it is exceptionally essential to enhance the antecedents of individual innovation.

3.0 Methodology

3.1 Sample

This study employs two steps to ensure the prepared instruments are valid and reliable. The first stage is the validity test involving four (4) experts panel to assess the adopted items. Utilizing the content validity index (CVI) proposed by Yusoff (2019), the relevancy and clarity of items were examined. Based on the given recommendations, one item was dropped before the pilot study.

Subsequently, a pilot test was conducted. The pilot test is a recognized process before a full-fledged survey study to find operationalization errors in the variables, prevent issues during actual data collection, lower measurement errors, and ensure the instrument is clear and simple to use (Sekaran & Bougie, 2016). Nevertheless, Serdar et. al. (2021) suggested that minimum 30 participants would be efficient and preferable if estimating test-retest reliability or item discrimination.

At the end of the pilot data collection phase, 40 usable surveys were returned out of 65 surveys distributed. Each questionnaire was manually checked to ensure the surveys were appropriately answered

3.1 Measurement

The questionnaire utilized scale measurements that were modified based on earlier verified items to fit the level of knowledge management, absorptive capacity, and innovative capability of an individual. The questionnaire was created to assess all pertinent ideas and variables as well as the respondents' demographic data. The concepts, variables, sources, and number of items are exhibited in Table 1.

Table 1. Measurements sources

CONCEPT	VARIABLES	SOURCES	ITEMS
Knowledge Management	Knowledge Identification	(Masa'deh et al., 2017; Mehrabani & Shajari, 2012)	6
	Knowledge Access	(Masa'deh et al., 2017; Mehrabani & Shajari, 2012)	8
	Knowledge Distribution	(Masa'deh et al., 2017; Moos et al., 2013; Valentim et al., 2016)	5
Absorptive Capacity	Knowledge Acquisition	(Distel, 2019; Kang & Lee, 2017; Lowik et al., 2017)	6
	Knowledge Assimilation	(Distel, 2019; Kang & Lee, 2017; Lowik et al., 2017)	7
	Knowledge Transformation	(Distel, 2019; Kang & Lee, 2017; Lowik et al., 2017)	5
	Knowledge Exploitation	(Distel, 2019; Kang & Lee, 2017; Lowik et al., 2017)	6
Innovation Capability	Change Readiness	(Ayrancı & Ayrancı, 2015; Lukes & Stephan, 2016; Saunila, 2014)	8
	Creative Thinking	(Ayrancı & Ayrancı, 2015; Kang & Lee, 2017; Lukes & Stephan, 2016)	8
	Empowerment	(Muhammed, 2006)	4

4.0 Findings and Analysis

4.1 Validity results of the pilot study

Reliability refers to the ability to replicate the same result even after repeated test phases, whereas validity is defined as the representation of the study topic or variable in the measurement. Both are necessary to identify a measurement as being reliable, accurate, appropriate, and bias-free (Sekaran & Bougie, 2016). In doing so, Yusoff (2019) recommended having experts review the measure's original item selection. The experts were, therefore, given the freedom to suggest any extra things that may be included in the scale to reflect the structure as described accurately and the chance to offer additional commentary on the particular items or measures.

The content validity index (CVI) of the instruments was evaluated by four experts in the field of agricultural research, two (2) experts from the Universiti Putra Malaysia (UPM), and two (2) experts from the Malaysian Agricultural Research and Development Institute (MARDI). The consent for each feedback was properly obtained in the ethical concern stage. The result of the validity index that the CVI evaluated for item-level (I-CVI) and scale-level (S-CVI), I-CVI should have a 1.00 value for 3 to 5 experts and S-CVI/Ave should be higher than 0.90 as recommended by Yusoff (2019).

The analysis results show that all item CVI (I-CVI) has exceeded 0.90 I-CVI value except KTrans_4. Thus, the KTrans_4 item was dropped from further analysis leaving behind the knowledge transformation variable with 4 items. The S-CVI/Ave also reveals a satisfactory 0.996 value, beyond recommended 0.9 value.

4.2 Reliability results of the Pilot Study

Additionally, SmartPLS software version 3.2.8 was sequentially employed for testing Cronbach's alpha reliability and composite reliability test of the instrument. The respondent's demographic profiles are shown in table 2 below, demonstrating the representation from various group of respondents involved.

Table 2. Respondents Demographic Profile

	CATEGORY	FREQUENCY
Gender	Male	15
	Female	25
Race	Malay	33
	Chinese	2
	Indian	2
	Other Bumiputra	3
Age Group	26-30 Years old	3
	31-35 Years old	8
	36-40 Years old	14
	41-45 Years old	6
	46-50 Years old	3
	51-55 Years old	5
	56-60 Years old	1
Work Experience	1-5 Years	4
	6-10 Years	9
	11-15 Years	13
	16-20 Years	7
	More than 20 Years	7
Education	Bachelor	31
	Master	8
	PhD	1
Research Category	Food Science	6
	Plant Science	1

Animal Science	28
Others	5

The result from table 3 and figure 1 using PLS 3.2.8, the reliability from table 3 indicated that Cronbach's alpha value of all the ten (10) constructs ranged from 0.601 to 0.867. Sekaran & Bougie (2016) advocates that the minimum acceptable level is 0.60; otherwise, the instrument is poor. Hence, all variables exceeded the recommended value.

Furthermore, according to Hair, Hult, Ringle, & Sarstedt (2017), higher scores for the composite reliability criterion denote higher reliability levels. For example, findings between 0.70 and 0.95 are considered "satisfactory to good" reliability levels, and values between 0.60 and 0.70 are deemed "acceptable in exploratory research." As a result, all composite reliability values for the instrument are above 0.70, which is considered acceptable and confirms that the instruments have good reliability, following the reliability result.

Table 3. Reliability Analysis

Variables	Number of Items	Cronbach's Alpha	Composite Reliability (CR)
Change Readiness	6	0.811	0.859
Creative Thinking	8	0.808	0.862
Empowerment	4	0.731	0.834
Knowledge Access	6	0.857	0.881
Knowledge Acquisition	7	0.861	0.897
Knowledge Assimilation	5	0.867	0.897
Knowledge Distribution	7	0.824	0.874
Knowledge Exploitation	8	0.866	0.9
Knowledge Identification	6	0.734	0.819
Knowledge Transformation	4	0.601	0.766

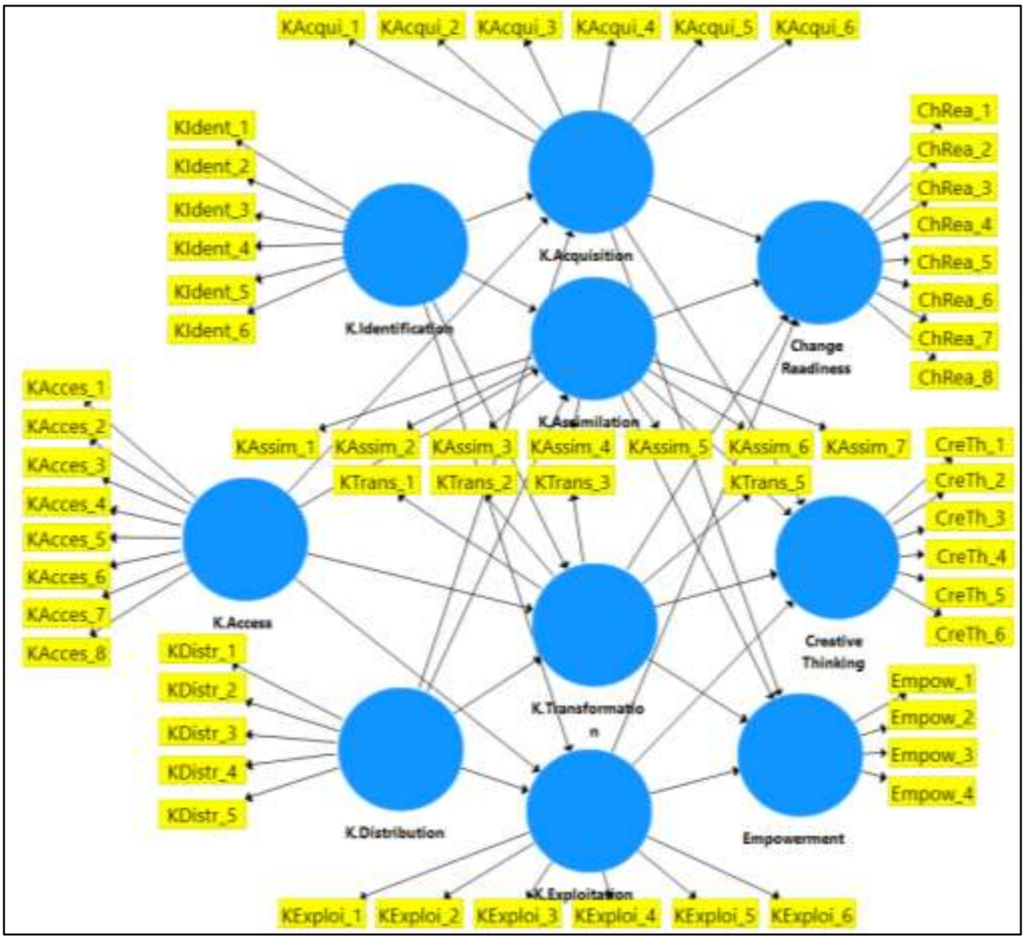

Fig. 1: Research Model in SmartPLS

5.0 Conclusion and Future Direction

Prior to conducting a large-scale investigation, the pilot study's objectives, as previously stated, were to examine the validity and reliability of the instrument in a more limited setting. The validity test findings showed that all ten (10) variables had Cronbach's alpha and composite reliability within the agreeable value, with content validity greater than 0.90. As well, previous findings supported the validity of the tools used in the investigation.

The study's contributions provide clarity to ensure that the instrument's validity and reliability will be appropriate for the actual research that will be conducted in the future. Additionally, the key purpose of this study is to improve understanding and complexity of innovativeness in Malaysia's agricultural R&D activities in a variety of ways. As the analysis results shows substantial level of fulfilment, the instrument developed is adequately verified for the further analysis into the population of agricultural researchers. Given the essence of this study is to preliminarily evaluate the questionnaire, it is noteworthy that findings from this study are limited to the sample size collected and generalization of the results for the respondent’s population are also impractical.

According to the knowledge-based value theory, KM and ACAP are significant intangible resources for the sustainability of organizations. This study will further look for new approaches to improving the value addition for all resources, particularly innovation, to obtain a competitive advantage. Furthermore, it will examine this relationship to understand better how absorptive capacity mediates the three variables of knowledge management and innovation capacities in Malaysia's agricultural R&D ecosystem. In term of policy propositions, the government and the pertinent organizations will be helped by the study's results in developing and advancing agricultural-based research in Malaysia. The findings will also aid the sector's decision-makers in better understanding the critical elements that should be promoted to enhance their R&D performance significantly.

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