Academic Staff and Industry Revolution 4.0: Knowledge, Innovation and Learning Factor

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Abstract

The higher education institutions play a very important role in developing the readiness of academic staff on IR 4.0 which might increase the quality of education system through implementing the effective learning factors, efficiency knowledge management factors, and creative thinking with the innovation capability. Here, the academic staff must further explore the new knowledge, innovation, and learning factors that could be used in their teaching and learning. The research model was taken from previous studies on examining the feasibilities of Industry 4.0 for the hospitality sector with the lens of management practice. The data was analyzed by using the IBM SPSS Statistics v21 and the five-point Likert scale represented by Information Literacy Education Implementation Readiness Scale was used to measure the respondents' readiness level on IR 4.0. Descriptive analysis than was used in this research to further explore the mean factors which are learning, knowledge management and innovation capability, and the academic staffs' readiness for IR 4.0.. The results indicated that the learning institutions played a very important role in developing the readiness of academic staff on IR 4.0 which may increase the quality of education system through implementing the effective learning factors, efficiency knowledge management factors and creative thinking with innovation capability factors.

Keywords: Industry 4.0, Job creation, Job opportunities, Higher education institutions, University, Academic staff.

Contents

Contribution of this paper to the literature
The research model was taken from previous studies on examining the feasibilities of Industry 4.0 for the hospitality sector with the lens of management practice.

1. Introduction

The first bit of research on the level of readiness was in 1978 on the self-directed learning readiness scale among graduate students in a doctoral program. The factors such as a willingness to adapt in education, creativity, future orientation, the capability of self-image, resourcefulness, and self- determination in learning, an obligation to study, affection for education and the capacity to use basic learning and rationally thinking skills are the indicators used to evaluate the level of self- directed learning readiness (Ahmad, Segaran, Soon, Sapry, & Sarah, 2019; Torrance & Mourad, 1978).

There is very little research related to the readiness of Industrial Revolution 4.0 (hereafter referred to as IR 4.0) in the form of a report and no specific studies regarding this field. Normally, the readiness in IR 4.0 can be determined by analyzing academic staff's current skills and the ability to acquire new skills because they are most affected by the changes of technology in an institution directly impacting their work environment (Chouhan, Mehra, & Dasot, 2017).

This research was conducted to explore the factors that influence academic staff' readiness for IR 4.0. We know what factors will influence readiness and have used it as the mechanism to analyze the readiness among academic staff on IR 4.0. We wanted to identify the different readiness factors such as learning, knowledge management, and innovation capability that might influence the readiness among academic staff.

Learning can be categorized as self-directed learning (SDL) which is known as a method of instruction where the learner takes responsibility for self-learning (Fisher & King, 2010). Most academic staff take the initiative to learn of skills or knowledge which can affect the readiness of them to adapt to the changes towards IR 4.0. It may also have decreased the development of institutions with the digital transformation of technology. There are many types of effective learning approaches which can be used by the academic staff rather than the traditional face to face lecturing approaches in institutions (Aljaser, 2019; Baena, Guarin, Mora, Sauza, & Retat, 2017; Saleem & Ilyas, 2019).

The larger investment in IR 4.0 technology by the institution is not always underpinned by successful knowledge management and the main pillar of achievement rests on academic staff's readiness and commitment towards the adaption of the new technology with effectively in working organization (Rusly, Corner, & Sun, 2012). The readiness of knowledge management (KM) among the academic staff has the potential to make the institution more related to their parent organizations' effectiveness (Laila, 2012). Ineffective readiness among academic staff in knowledge management towards IR 4.0 can also bring more failures for the institution.

Last but not least, the innovation capability is the high-order integration capability that can endlessly convert the knowledge and ideas into new processes and systems of an institution (Fei, Zhao, Chi, & Yajing, 2014). Currently, the academic staff needs to be ready to adapt and with innovation capabilities to survive in an unpredictable environment due to IR 4.0 (Hussein, Singh, Farouk, & Sohal, 2016). The readiness on innovation capability among academic staff still needs to be analyzed so every learning institution can adopt IR 4.0

2. Learning Factors

The learning has been occurring at different levels such as individuals, groups, and organization, and self-directed learning levels play a very important role among many staff whether they have an internal or external locus of control (Lappia & Streumer, 2012). Here, a special view of individual staff learner achievement consists of skill-based knowledge that were still considered as 'standard learning paradigm' (Johnsson, Boud, & Solomon, 2012).

Most of the learning is developed and encouraged. Individual learning or self-learning is a highly effective method of literacy in adult education implemented by many institutions especially for their academic staff nowadays (Figurska, 2016). The learning institutions are trying to prepare the academic staff with high learning objective direction efforts to prove their competence over the acquirement of new skills and knowledge towards IR 4.0 (Van Der Rhee, Verma, Plaschka, & Kickul, 2007).

Self-directed learning is a development originated by individuals such as employees in an organization which may or could not use the assistance of others, to recognize their learning desires, improve learning objectives from these requirements, identify the necessary needs of resources to achieve this objective, select and implement the right learning strategies to meet their objectives and determine how to measure the readiness of learning outcomes (Fleming, Artis, & Hawes, 2014). Some staff who do not require or accept computer training at work shows their work is threatened because every employee is supposed to master everything such as technical skills and knowledge needed for IR 4.0 by self-directed learning (Gripenberg, 2011). It has been proved that technical skills comprised of new technology devices and the internet of things have the strongest connection with the readiness of academic staff in achievement and performance in IR 4.0 in management (Harun & Mustafa, 2016). Therefore, many institutions expect their staff able to adapt to the changes of the working environment in IR 4.0 through self-directed learning but at the same time they still need to evaluate the readiness of their staff.

3. Knowledge Management

Knowledge management is a form of strategy for discussing the institution's management objectives and environments that support the formation of organizational knowledge by observed knowledge management strategies through the achievement, exposition, and communication on mission-based professional proficiency that is generally implied to organizational participants particularly academic staff in an applicable, timely and focused manner, applicable and timely (Yang, 2010).

The storage in the knowledge management process is about developing an organizational memory where knowledge is officially stored in a physical memory system, connected with the information system which is

informally retained as the values, norms, and beliefs associated with an institution's organizational routine in the adaption of IR 4.0 (Gonzalez & Martins, 2014).

The knowledge utilization in knowledge management process is the ability of staff in the organization of an institution to discover, access and use information and knowledge stored in the formal and informal memory systems of the organization (Gonzalez & Martins, 2014; Jürgens & Krzywdzinski, 2013) for preparing themselves for IR 4.0

4. Innovation

Innovation is the use of ideas or behaviors that can be innovative products, new technologies or new administration that staff and their organizations implement in environment changes (Hussein et al., 2016). Every management teams have to cooperate and exchange information among staff to involve in high levels of problem-solving and innovative actions required to achieve the innovation capability in an institution (Lee & Kelley, 2008). The implementation of the innovation capability by the institutions is done even faster towards environmental challenges on IR 4.0 compared to other institutions which have not implemented the innovation capability in their management (Ngamsutti, 2016). Knowledge sharing among staff in every institution often involves the process of innovation through encouraging interaction and innovative ideas towards new technology (Kumar & Rose, 2012). The innovation capability is the concept of technology development capability, operation capability, management capability, and transaction capability in an organization (Zawislak, Alves, Tello-Gamarra, Barbieux, & Reichert, 2012). The technology development capability of the organization in many institutions leads to form or revolutionise its working capacity especially when aligned towards IR 4.0's to adopt skill and knowledge by accomplishment higher levels of technical-economic change that allows for a successful innovation process (Zawislak et al., 2012; Zhou & Wu, 2010).

5. Findings and Discussion

Most of the past studies from the researcher give a positive bias in the literature reviews on this topic. However, there are a few negative literature reviews from other researchers which were not stated in this chapter. Most of the past studies focusing on the relationship between variables are found in this report and very little was conducted by the researchers especially on IR 4.0 because this field is considered new which has allowed many researchers to focus on the manufacturing of IR 4.0 than on academic perspectives

Descriptive analysis was used in this research to find the mean of the factors which are learning, knowledge management and innovation capability, and the academic staffs' readiness for IR 4.0. The data collected was analyzed by using the SPSS program, and the five-point Likert scale represented by Information Literacy Education Implementation Readiness Scale was used to measure the respondents' readiness level on IR 4.0.

Table-1. Mean Score Interpretation.

Mean Score	Interpretation
1.00 to 2.33	Low/Negative
2.34 to 3.66	Average/Neutral
3.67 to 5.00	High/Positive

Source: Mukminin and Hidayat (2013).

The scale was used in the questionnaire to identify the level of academic staffs' readiness based on Table 1, which is similar to the interpretation used by researchers (Hadiyanto, Jambi, Skills, & Skills, 2018; Mukminin & Hidayat, 2013) in the study to identify the school librarians' readiness in information literacy education implementation.

5.1. Mean Analysis of Learning

The learning factors that were influenced by academic staff readiness in this study showed a high level of readiness with a second-highest average mean of 3.927 as shown in Table 2.

Table-2. Learning means score.

Learning	Mean	Std. Deviation
I have the technical skills required in IR 4.0	3.53	0.703
I am ready to direct my learning of IR 4.0.	3.85	0.671
I will ask for help in my learning about IR 4.0 when necessary.	4.19	0.703
I prefer to prepare my own learning goals for IR 4.0.	3.69	0.703
I enjoy learning new information regarding IR 4.0.	4.15	0.580
IR 4.0 improves my work performance through learning	3.99	0.591
IR 4.0 provides new learning opportunities for me.	4.09	0.638

Particularly, the highest mean score with the high level of readiness was recorded for LR 3 (I will ask for help in my learning about IR 4.0 when necessary) with Mean=4.19, SD= 0.703. Meanwhile, the lowest score was obtained for LR1 (I have technical skills required in IR 4.0) with Mean= 3.53, SD= 0.703. It shows that the academic staff readiness towards learning technical skills required for IR 4.0 is still at the average or neutral level of readiness because of the range of mean in between 2.34 to 3.66.

5.2. Mean Analysis on Knowledge Management

The knowledge management factor towards academic staff readiness is still at the average or neutral level of readiness in between mean range as shown in Table 3 (2.34 to 3.66) and also obtained the lowest average mean of 3.223 compared with other variables in this study.

Table-3. Knowledge management mean score.

Knowledge Management	Mean	Std. Deviation
My management provides various formal training for IR 4.0.	3.06	0.890
My management provides informal individual development programs for IR 4.0.	2.99	0.897
I am satisfied with the contents of the job training programs of IR 4.0.	3.02	0.892
Sharing of knowledge IR 4.0 would enable me to accomplish a task more quickly.	3.73	0.758
My management always supports the IR 4.0.'s knowledge-sharing initiatives.	3.46	0.715
My management provides resources for IR 4.0's knowledge-sharing initiatives.	3.23	0.805
My management formulates strategic plans for knowledge sharing about IR 4.0.	3.13	0.754
My management has specific objectives for knowledge sharing regarding IR 4.0.	3.16	0.737

Based on Table 3, the highest score is obtained for KM 4 (Sharing of knowledge IR 4.0 would enable me to accomplish a task more quickly) with Mean= 3.73 and SD=0.758. It is showed the academic staffs' readiness in knowledge management factor are still in high level of readiness with slightly agree with the statement as mention above. Moreover, the lowest score obtained for KM 2 (My management provides informal individual development programs for IR 4.0) with Mean=2.99 and SD=0.897. Therefore, the lowest score is obtained for academic staffs' level of readiness influenced by knowledge management has been shown still but still in the average and neutral level of readiness in between mean range 2.34 to 3.66 which showed the management less provides informal individual development program regarding IR 4.0 for the academic staffs.

5.3. Descriptive Analysis of Innovation Capability

The innovation capability factor towards the level of academic staffs' readiness is still at average or neutral level of readiness in between mean range $(2.34 - 3.66)$ and also recorded the third-highest average mean of 3.654 in this study. Based on table 4.16, the highest score is obtained for IC 1 (The innovation process towards IR 4.0. helps to increase performance) with Mean=4.11 and SD=0.614 as shown in Table 4.

Table-4. Innovation capability mean score.

Innovation	Mean	Std. Deviation
The innovation process towards IR 4.0. helps to increase performance.	4.11	.614
My institution divides job tasks according to the capability of staff for IR 4.0.	3.33	.833
My institution frequently tries out new ideas according to changes in IR 4.0.	3.44	.848
My institute seeks out new ways to continue innovation on IR 4.0.	3.50	.853
My institution gives chances for staff to express their ideas.	3.65	.817
My institution encourage staff to be creative thinking towards IR 4.0.	3.77	.797
I apply new skills in management for continuous innovation of IR 4.0.	3.76	.714
I provide new ideas in management for continuous innovation of IR 4.0.	3.67	.793

It showed that the academic staff have a high level of readiness or strongly agree on the innovation process on IR 4.0 which may help to increase their working performance. The lowest score was recorded for IC 2 (My institution divides job tasks according to the capability of staff for IR 4.0) with Mean = 3.33 and SD= 0.833. The lowest score was obtained for the academic staff's level of readiness for innovation capability which was still at the average or neutral level of readiness.

6. Conclusion

The institutions play a very important role in developing the readiness of academic staff on IR 4.0 which may increase the quality of education system through implementing the effective learning factors, efficiency knowledge management factors, and creative thinking with innovation capability factors. In addition, the institutions may create more productivity management by appointing high skilled and knowledgeable academic staff and can provide more training for skills and knowledge needed for IR 4.0 according to the readiness level of academic staff from this study.

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