CONSTRUCTING THE IMPACT OF INDUSTRY 4.0 ON SMES PERFORMANCE AMONG MALAYSIAN MANUFACTURING ORGANISATION

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ABSTRACT: *The level of Industry 4.0 usage among Malaysian organizations have yet to reach its optimum level, particularly among SMEs, which are lagging behind SMEs in the developed countries. The technology found to be a crucial factor that let to successful performance among SMEs. Therefore, this paper explores the factor impacted the adoption of Industry 4.0 and proposed a conceptual framework which incorporates cultural and technological factors contributing to Industry 4.0 adoption and SMEs performance among Malaysian manufacturing organisation. The proposed research design for this research study is based on quantitative method. This study will provide useful knowledge regarding Industry 4.0 uptake among SMEs in Malaysian manufacturing organisation from technological and cultural perspectives.*

Keywords: Industry 4.0, Small Medium-sized Enterprise, technology, culture

INTRODUCTION

The expansion of Industry 4.0 which is part of the ICT development has been emphasized as an important phase in the successful logistical process for better productivity in workplaces around the world. The Malaysian government has made a significant amount of investment in the development of Industry 4.0 among Malaysian organisations mainly among Small Medium-sized Enterprise (SMEs), which are anticipated to be at the lead of technological change and knowledge innovation. The level of Industry 4.0 usage among Malaysian organisations have yet to reach its optimum level, particularly among SMEs, which are lagging behind SMEs in the developed countries. Other than technological factor, culture is vital not only seen as a factor for the success or failure of transferring new technology in an organisation, but also as the reason for the organisation to adopt new technology at the first place [10,11]. Therefore, both technological and cultural factors play major roles in adopting industry 4.0.

Hence, this study seeks to create a comprehensive model for analysing and constructing the relationship between Industry 4.0 usage, technological factor and cultural factor on SMEs performance among Malaysian manufacturing organization. The technology found to be a crucial factor that led to successful performance among SMEs. [15] argue that the adaption on Industry 4.0 can be unfolded by the adaptability of employees in the organization. A study by The Boston Consulting Group in Singapore suggested that rapid adoption of Industry 4.0 in Singapore may well increase SGD36 billion in total manufacturing output, improve labour productivity by 30 percent, and generate 22,000 new jobs in Singapore by 2024 [9].

Although SMEs produce a significant impact to the economy, [8] explained that they normally suffer from ineffectiveness to extend their services 24 hours a day and 7 days a week due to the lack of alleviation of technology which effects from lack of nationwide geographical presence. The performance of SMEs also depends on the innovation technology applied in the origination which proven by the study done on food manufacturing where organization unable to gain competitiveness due to lack of innovation [2]. ICT has been introduced extensively by the Malaysian government, but there are still low of Industry 4.0 adoption among SMEs. In 2017, the Malaysian government allocates RM 2.5 billion for SME development in Malaysia, where RM 236.7 million from that amount is for SMEs adoption on innovation and technology [17]. Malaysian manufacturing sector currently is still ranging between mass production automation industry revolution 2.0 and 3.0 due to low adoption of new technology [12]. Therefore, there is a need for Malaysia SMEs manufacturing sector to adopt Industry 4.0 and subsequently increase the performance of the organisation and to avoid Malaysia in losing Foreign Direct Investment (FDI) to other countries.

The previous study also found that the adoption and rejection of technology are due to the technological and cultural factor. For example, the study done by [10,11] found that culture and technological factor has a significant relationship with technology adoption among Malaysian organisation. However, both studies look into email usage which was an old form of technologies and [10] also suggests that future study need to construct technological and cultural factors with the new and more recent technology. Thus, it was found that there is a lack of empirical study on identifying and constructing the role and relationship technological and cultural aspect on the adoption of Industry 4.0 among SMEs in the manufacturing sector in Malaysia. Therefore, this study will fill in the research gap on the adoption of Industry 4.0 among Malaysian SMEs in the manufacturing sector.

LITERATURE REVIEW

Small Medium-sized Enterprise

The rapid growth on Small Medium-sized Enterprise has contributed for over 95% of firms and 60%-70% of employment and contribute to a large share of new jobs in economies [14]. [14] stated that it should be noted that there are not standard of small and medium-sized enterprise (SME) definition because it defined differently across countries. However, SME can be generalized based on the firm's employment legislation which is [14] refers to firms employing less than 249 persons which carried micro (1 to 9), small (10 to 49) and medium (50-249). In Malaysia,

Small Medium Enterprise SMEs were known as the backbone of the country which contributes the most in economic growth. Based on [4] there are 98.5% of SME establishments which represent 907, 065 of total SMEs in Malaysia. SMEs were divided into few sectors as illustrated below which shows that the services sector were a domain with 89.2 % and followed by manufacturing with 5.3 %. While mining and agriculture contribute 0.1 % and 1.1 % respectively [12].

[1] stated that the contribution of SMEs in economic growth has been proven by developed countries such as Japan, China and Korea and many others. Therefore it believed that the new and existing industries in SMEs are inarguable on strengthening the country economy. In recent years it can be summarized that the contribution of SMEs has given high impact in increasing the domestic economy in every country. As suggested, to increase the performance of SME, most countries are leading toward adaption of Industry 4.0 in SMEs to cater to the revolution of technology toward manufacturing productions.

Industry 4.0

The Industry 4.0 revolution recognize as industrial transformation which transforms the business activities by integrated the technologies used for all sector into a new system. The revolution of Industry 4.0 brings the huge phenomenon in manufacturing sector ranging with several of technological evolution in SMEs. There are few main technology pillars of industry 4.0 which contain nine elements including Autonomous Robots, Big Data Analytics, Cloud Computing, Internet of Things (IoT), Additive Manufacturing, System Integration, Cybersecurity, Augmented Reality and Simulation [13]. Apart from all the initiative done on SMEs, it can be summarized that there is still low adoption among SMEs in Malaysia, particularly among the Malaysian manufacturing sector. The previous study also found that the adoption and rejection of technology is due to the technological and cultural factor. For example, the study done by [10,,11] found that culture and technological factor has a significant relationship with technology adoption among Malaysian organisation.

National Culture

By focusing on SMEs adoption on Industry 4.0 using National Culture construct may help this study to seek the contribution on how culture dimension may affect the SMEs performance. It was supported by [16] which mentioned that focusing on SMEs on entrepreneurial orientation may link to the SMEs performance. [6] describe culture as norms, values and beliefs shared by members of a particular group or community in a particular geographic location. Therefore, this study will adopt Hofstede Theory on analyzing the element of culture in adopting technologies where it contains six-element established by Hofstede's. the dimensions are power distance (PD), individualism vs. collectivism (IDV), masculinity vs. femininity (MAS), uncertainty avoidance (UA), long-term vs. short-term orientation (LTO) & indulgence vs. restraint (IVR) [6].

i. Power Distance (PD)

The Power distance (PD) term is defined as "the extent to which the less powerful members of the institutions and organisations within a country expect and accept that power is distributed unequally" [6]. [7] elaborated that in the context of Malaysia's culture, it has the highest PD index score which shows that very unequal power organisational structure. [10] suggests that compared to other countries, Malaysia has high power distance culture where it elaborated that the level of power distance in organisation will likely influence the tendency to accept the perceived usefulness (PU) and perceived ease of use (PEOU) on technology usage**.**

ii. Uncertainty Avoidance (UA)

Uncertainty Avoidance (UA) defines as "the extent to which the members of a culture feel threatened by uncertain or unknown situations" [5]. [5] stated that Malaysia has a low and weak UA which ranked 67 out of 76 countries. It was also supported by the research done by [10] where organisation with higher uncertainty avoidance culture will be more likely to have a lower level of perceived usefulness on technology usage.

iii. Collectivism (C)

Based on [6] collectivism is a "---societies in which people from birth onwards are integrated into strong, cohesive in-groups, which throughout people's lifetimes continue to protect them in exchange for unquestioning loyalty". In the context of collectivism and individualism, Malaysia ranks 22 and 54 respectively [5]. This reflects that Malaysia tends to be more collectivism compared to individualism. In the context of Industry 4.0 usage (for example) it assumes that when the IDV is low, usage might be intense among small, close-knit groups but with loose ties only to other groups.

iv. Masculinity /Femininity (MF)

According to [5] masculinity can be defined as "when emotional gender roles are distinct: men are supposed to be assertive, tough, and focused on material success, whereas women are supposed to be more modest, tender, and concerned with the quality of life. Femininity is the dominant social feature in a society] when emotional gender roles overlap: both men and women are supposed to be modest, tender, and concerned with the quality of life". Malaysia ranked 34-36 masculinity amongst 76 countries [5]. This means that, in the regards of gender norms, Malaysia can be classified as not too stratified or too lenient.

v. Long Term/Short Term Orientation (LTO)

[5] define long-term orientation (LT) as "---the fostering of virtues oriented toward future rewards- in particular, perseverance and thrift". While, short-term orientation (ST) is "---the fostering of virtues related to the past and present- in particular, respect for tradition, preservation of 'face', and fulfilling social obligations". [5] examined only 23 countries and Malaysia has no score or data for LTO in their table. However, according to [5] the latter study suggested Malaysia ranked 50 amongst 93 countries. This reflects that Malaysian society is whether in the middle category, which means that maybe they can be too future-orientated or too past and present orientated.

vi. Indulgence/Restraint (IVR)

[5] noted Indulgence as characteristic of "---a tendency to allow relatively free gratification of basic and natural human desires related to enjoying life and having fun. In the opposite pole, restraint reflects a conviction that such gratification needs to be curbed and regulated by strict social norms". According to [5], Malaysia ranked 27th to 29th among 93 countries which then supported by research [10] which found that organisation which has higher indulgence likely to have higher tendency to accept technology adoption.

Technology Acceptance Model (TAM)

Technology Acceptance Model which develop by [5] will be used to understand the individual adoption on certain technology. TAM was chosen to be part of this research study rather than other theories is because TAM can explain the technology acceptance and has been widely using in the technological research field as proven research done by [10,11]. Therefore, in these cases, TAM will contribute to identifying the adoption of Industry 4.0 among SMEs in Malaysian manufacturing organisations

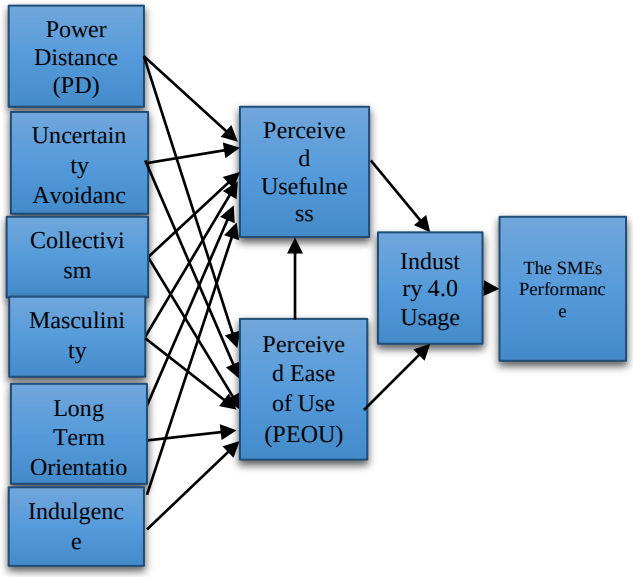
i. Perceived Usefulness (PU)

Perceived Usefulness (PU) "the degree to which a person believes that using a particular system would enhance his or her job performance" [3]. [18] stated that 'Usefulness' can be defining as the measurement of technology and the capability to achieve the level of competency and precision. It was supported by [20] where the worker highly rated the perceived usefulness of technology, it will also reflect the levels of actual technology acceptance.

ii. Perceived Ease of Use (PEOU)

Perceived Ease of Use (PEOU) is defined as "the degree to which a person believes that using a particular system would be free of effort and ease giving the idea of freedom from difficulty or great effort" [5]. [5] found that PEOU is a vital element in determining the use of the system. Research done by [6] found that there is a positive influence level of PEOU on technology usage in Malaysian universities since the application of technology should be a convenience for people to adopt it easily. Hence, this research study adopts the elements of TAM as its part of the conceptual framework.

RESEARCH FRAMEWORK



Adopted from David (1989) and Hofstede et al. (2010)

METHODOLOGY

The proposed research design for this research study is based on quantitative method. The data will be collected through survey questionnaires among SMEs specifically Bumiputera and Non-Bumiputera among SMEs in the manufacturing sector. The results from the surveys will be analysed using Structural Equation Modelling (SEM) which is capable of confirming relationships between different constructs. By focusing on Bumiputera and Non-Bumiputera SMEs, the study will also seek to identify specifically the effect of organisational culture on the uptake of industry 4.0 in the Malaysian manufacturing sector.

CONCLUSION

This study will provide useful knowledge regarding Industry 4.0 uptake among SMEs in a Malaysian manufacturing organisation. In a more specific manner, this study will provide: a) Information on the influencers of Industry 4.0 uptake. b) the knowledge that allows interested parties to enhance the uptake of Industry 4.0 among SMEs in Malaysian manufacturing organisation, leading to substantial economic benefits.

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