

The Influence of Technology Factors on Retail 4.0 Adoption in Malaysia

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ABSTRACT

The younger generation, i.e., Gen Y and Gen Z, would make up 67% of Malaysia's population in 2019. They are technically savvy and have huge spending power. Since this young generation is attracted to novel and exciting shopping experiences, Malaysian retailers should entice them by incorporating Retail 4.0 technologies into their existing retail formats. This paper used the technology construct from the Technology-Organization-Environment (TOE) Framework to study the factors which will play a crucial part in the adoption of Retail 4.0 technologies. Although retailers are likely to face many challenges during the technology adoption process, proper strategy and also financial aid from the government will help retailers to overcome these obstacles and will eventually lead to the full digitalization of the Malaysian retail industry.

Keywords: *Technology adoption, Retail 4.0, TOE Framework, retail industry, Malaysia*

1. INTRODUCTION

In the past few years, the retail industry has evolved from what used to be just 'bricks and mortar' outlets to omnichannel retailing [1]. Retailers have incorporated technologies which offer novel and exciting shopping experience for customers [2]. Why are the retailers doing this? The main aim is to entice the younger generation i.e Gen Y and Gen Z who, in 2019, would make up 63.5% of the world's population [3] and 67% of the Malaysian population [4]. Besides being technically savvy, this young generation has got huge spending power [5].

Retailers usually look at financial factors like ROI, payback period and profitability when they select shopper-facing technology. However, customers' acceptance of new technologies is also a very crucial variable for consideration when retailers select and adopt new technologies [6].

The Technology-Organization-Environment (TOE) Framework [7] has been widely used to study the adoption of various Industry 4.0 technologies in many industries around the world [8], [9], [10] and [11]. In this paper, the technology construct from the TOE framework will be used to determine the factors which influence the adoption of various retail 4.0 technologies in the Malaysian retail industry.

2. LITERATURE REVIEW

2.1 Retail 4.0 Technologies

Retail 4.0 can be defined as the incorporation of Industry 4.0 technologies in the retail industry and also the combination of both the offline (or 'bricks and mortar') and

online shopping channels which gives rise to omnichannel shopping options [12].

Omnichannel shopping refers to the use of a variety of channels to interact with customers and fulfill their orders [1]. These channels include a mixture of the traditional offline, online [13] and a combination of online and offline channels which is known as 'bricks and clicks' [14]. 'Bricks and clicks' can be further divided into 'Webrooming' which is the process of searching for product information online and then purchasing offline [15] and 'Showrooming' which can be defined as searching for a product offline i.e at a 'bricks and mortar' outlet and then purchasing the item online [16].

'Brick and mortar' outlets can be given a new lease of life through the incorporation of various Retail 4.0 technologies [17] as novel technology can enhance the quality of customer's shopping experience [2], [18]. Given below are a few examples of Retail 4.0 technologies:

Augmented / Virtual Reality (AR / VR) technology provides a computer-mediated environment which makes the user feel a sense of presence and also has the ability to engage the human senses [18]. AR technology has enabled students in Germany and Italy to try on sunglasses via web cameras [19] and has also been used as a shopping aid in the United States [2].

Autonomous robots are being used for detecting inventory level and stocking shelves [20] and also as fashion advisors [21] in retail outlets in Italy. Big data helps retailers to determine the type of assortment they should carry [22] and also to track and attract new customers [23]. RFID (Radio Frequency Identification), which is a technology under Internet of Things [12] [24], has been used to manage backroom inventory [25] and also in 'smart' fitting rooms [26]. Last but not least, the 3D printing is already gaining popularity in the retail industry. There are Adidas shops in Berlin which are able to produce designer sweaters within a short period [27] using this technology.

2.2 Technology-Organization-Environment Framework

The TOE framework is an organization-level theory which shows that the technology adoption by firms is determined by three factors i.e Technology, Organization and Environment [28].

The TOE framework has been used successfully to study about technology adoption in various industries like the healthcare industry [11], manufacturing industry [8] [29], retail industry [9], tourism industry [10] and IT industry [30]. It has also been very effective when being used to study the adoption of different types of technology like RFID [11], Big Data [8], Augmented Reality [31], Cloud Computing [32] and 3D Printing [29]. As such, this framework can also be used to study the adoption of Industry 4.0 related technologies [31] in the Malaysian retail industry.

Table 1 shows a summary of the usage of the TOE Framework to study the adoption of various types of technology in different industries and countries.

Table 1. Usage of the TOE Framework to study technology adoption for various types of technology in different industries and countries.

Technology / Significant factors	Industry	Country	Reference
Cloud Computing:	Manufacturing Portugal		[33]
Augmented Reality:	Manufacturing Kingdom	United	[31]
Big Data:	Manufacturing Malaysia		[8]
Big Data Analytics:	Retail Kingdom	United	[9]
	IT Firms	India	[30]
3D Printing	Manufacturing	Taiwan	[29]
RFID	Healthcare Arab Emirates	United	[11]
Mobile Service Adoption:	Hotel Industry	Taiwan	[34]

2.2.1 Technology Factor

Past studies have found the technological context as the most important factor in determining technology adoption [8], [31]. The technological context comprises technologies which are already being used by the organization and also technologies which are already available in the market but not in-use yet by the firm [28] [35].

The three technological factors which have been found to be significant in the adoption of new technology by firms are relative advantage, complexity and compatibility. [36] defined Relative Advantage (RA) as the degree to which an innovation is perceived as being better than the idea it supercedes. RA is usually reflected in the form of cost saving and also increased profits after the new technology has been implemented by the firm [29].

In the studies conducted by [8], [10], [11], [30], [33] and [35], Complexity (CX) of the technology involved acted as an inhibitor for technology adoption. According to [36], the adoption of new technology is usually difficult if such technology is challenging to handle.

Compatibility (CM) has been described by [36] as the degree to which an innovation is consistent with the business processes, practices and value system. Firms are more likely to adopt technologies which are compatible with existing systems [10], [34] and [37].

Researchers have also found other factors under the technology context, like IT human assets or technology competency [9], [30] and industry type [29], [30], to be significant in determining the adoption of new technologies. IT human assets encompass knowledge, skill, professional competency and the abilities which are crucial for technology adoption [30].

Figure 1 shows the conceptual model of Retail 4.0 technologies adoption by the retail industry in Malaysia. This conceptual model combines the original factors under the technology construct of the TOE framework with additional factors derived from the literature review.

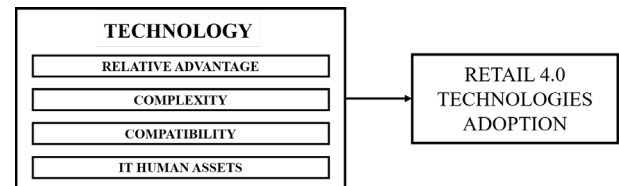


Fig. 1. Conceptual Framework for Retail 4.0 technologies adoption by Malaysian retailers

This framework is extremely useful to help determine the factors which encourage or inhibit the adoption of Retail 4.0 technologies by Malaysian retailers.

3. CONCLUSION:

Previous studies have found that different factors have influenced the adoption of technologies. For example, the studies on cloud computing [32], [33], [35] and Big Data Analytics [9], [30] have shown that the type of industry and the economic status of a country does influence technology adoption.

In Malaysia, although there is already evidence of Retail 4.0 technologies adoption [38], [39], the country is actually lagging behind other ASEAN countries like Singapore and Indonesia in its adoption of Industry 4.0 technologies. Only 15-20% of all companies in Malaysia have adopted these technologies [40]. Besides, while countries like Germany

and the United States had a maximum score of 4 in terms of Industry 4.0 technologies adoption, Malaysia only had a score of between 2.0 to 3.0 [41].

One of the main reasons for this slow adoption is the lack of skilled manpower to meet the requirements of Industry 4.0. Malaysia is too dependent on foreign workers and since these workers lack the required skill, then the productivity is reduced due to human error [42]. In a fully-automated system, there will be no human error and maximum productivity will be achieved [41].

As such, IT human assets is a crucial factor in ensuring the successful implementation of Retail 4.0 technologies [9] [30]. There is also a plan by the Malaysian government to increase highly skilled workers from the current 18% to 35% [43]. This can be done by providing training to upgrade the IT skills of the existing staffs and also by bringing skilled foreign workers into this country to train the Malaysians. As such, technology will play a significant part in determining the IT adoption in Malaysia.

The adoption of Retail 4.0 Technologies in Malaysia will not be without challenges. The Malaysian Prime Minister, Tun Dr. Mahathir Mohamad, launched the country's policy on Industry 4.0 i.e Industry4FWD in October 2018. The government has allocated RM 210 million from 2019 to 2021 to support the transition and migration to Industry 4.0 [44]. Retailers should make full use of this amount for the implementation of Industry 4.0 technologies. Besides, they should also equip themselves with the skills which are compulsory for survival in the high-tech industry. Furthermore, retailers can practice gradual implementation, that is by starting with one type of technology and then slowly increasing the number of technologies in the organization. In this way, there won't be too much financial burden on the retailers and at the same time, the retailers will eventually be able to adopt all the technologies which are relevant to the digitalization of the retail industry.

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