Researching Factors Affecting the Implementation of Digital Transformation in the Vietnamese Retail Industry: Using TOE Framework

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Abstract: Retail industry play an essential role in the economy. The retail industry has witnessed a solid digital transformation in recent times, especially under the catalysis of the Covid-19 outbreak. To maintain the sustainable development of the retail sector, firms need to know the determinants of the implementation and success of digital transformation to invest resources effectively. This research interviews experts to explore factors affecting digital transformation in the retail industry and employ the AHP method for analysis. The findings indicate that technology is the most significant factor of digital transformation, followed by the organization factor. The environmental factor is the slightest influence on digital transformation in the retail industry. Based on these findings, retail firms, the government, and other stakeholders can have appropriate solutions to promote digital transformation.

Keywords: AHP, digital transformation, determinants, retail industry, TOE framework.

1. Introduction

Digital transformation is changing production and business methods based on digital technology, bringing many benefits, such as cutting costs, reaching customers, and increasing operational efficiency. Digital transformation is becoming an essential trend in the retail industry, requiring a change in how business and technology are used to take advantage of effective distribution channels. Especially in the context of the Covid-19 pandemic, digital transformation has become necessary to cope with difficulties and enhance operational efficiency. The digital transformation under Industry 4.0 is resource-intensive and complex, necessitating a strategic digitalization roadmap (Ghobakhloo & Iranmanesh, 2021).

Digital transformation creates disruptive technologies; however, digital transformation highlights the great change in the business model. Gamil and Cwirzen (2022) emphasize the difference between digitization and digital transformation. Digitization is converting data stored in traditional documents to binary forms. In contrast, digital transformation is changing existing methods and models by utilizing cutting-edge technologies to generate real-time information for quick decision-making (Gamil & Cwirzen, 2022). Digital transformation uses Data-driven insights to trigger tactical or strategic business moves and launch digital business models that enable new ways to capture value (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013). Digital transformation includes digitizing communication channels and sales, which equip new ways to connect and engage with customers, as well as digitizing offerings (products and services), which replace or augment physical offerings. (Haffke, Kalgovas, & Benlian, 2016).

Technology is progressing, sometimes in a prevalent and disruptive way. Retail digital transformation is the shift from a product-centric business model along a supply chain to a customer-centric one based on a digital supply chain (Gupta & Ramachandran, 2021). In other words, digital retailing is the change from traditional retail to digital retail on electronic systems such as the Internet and computer networks. Organizations must identify digital transformation goals, have a suitable approach and implementation, and have a leadership team to embrace digital change and adapt to the outside world (Li, 2022). Right from the beginning with digital transformation, it is necessary to define goals in the near and far future; goals must be clear and have a plan for each of them, and take each step to be able to convert digitally successfully. In addition, leadership requires someone with a deep understanding of digital transformation. Business owners must be aware of the market's transition and the impact of the surrounding environment to give suitable methods to develop successful digital transformation. Although technology is essential, there is no shortage of human resources. Abundant human resources with creativity and

knowledge will contribute to the development of digital transformation. Third, the processes are carried out by human resources via the Internet, but should not be taken too seriously, but need flexibility to improve efficiency.

As a newly emerging country, Vietnam has a low maturity of digital transformation (Duyen, Bình, & Nga, 2023). The retail industry in Vietnam is dynamic due to the catalyst of the Covid-19 pandemic. However, there is a lack of evidence on digital transformation and its determinants from Vietnamese retailer firms. Exploring factors affecting digital transformation benefit retailer firms in improving their business model and enhancing effective digital transformation.

2. Objectives

This research aims to build a theoretical framework on factors affecting the digital transformation based on the DTI index set issued by the Vietnamese Ministry of Information and Communications (2021) pursuant to Decision No. 1970/QD-BTTTT, from December 13, 2021. The paper investigates factors affecting the implementation of digital transformation in the retail industry.

3. Materials and Methods

3.1. Developing hypotheses

The TOE framework postulates a general set of factors explaining and forecasting the probability of innovation adoption (Tornatzky & Fleischer, 1990). The TOE framework as an adoption framework attempts focusing on socio-economic perspective and admitting an interaction of organization's conditions and technology development associating to a business model reconfiguration formed by industry environment (Hossain & Quaddus, 2011). TOE is a popular theoretical framework used to analyze and measure the influence factors on the success of digital transformation, such as acceptance of EDI (Kuan & Chau, 2001), support ICT industry (Zhu, Kraemer, & Xu, 2003), and reveal obstacles to ICT adoption (Thong, 1999). This study is based on TOE framework to proposes three factors: technology, organization, and environment affecting the implementation of digital transformation in the retail industry context.

Technology factor

Digital technology transforms a traditional business model into a digital one by utilizing new technologies such as big data, the Internet of Things, and cloud computing to change the operational model. Many studies focus on the role of technology in the retail business. The functions and role of digital in business and marketing strategies are crucial during the Covid-19 pandemic (Izaak, Khristi, & Kusumawardhani, 2022). The application of cloud technologies and data analysis makes the success of digital transformation in enterprises (Walther et al., 2018). Technology is the application of scientific and technical knowledge to improve the quality of products and manufacturing processes; for example, using technology such as XBRL help firm enhance the quality of reporting (Duyen et al., 2023), or using technologies in e-learning can improve student satisfaction (Bình & Trà, 2022). Regarding technologies in the retail business, firms need to know how the technology is adopted, such as the availability of information technology, the digital infrastructure, the quality of data, information, blockchain technology, commerce, Internet communication, and information technology security affect the firm performance and competitive advantages of retailer firms (Izaak et al., 2022; Walther et al., 2018). Based on previous research, this study points out technology plays a significant role in the digital transformation of retail businesses. This requires firms to invest in infrastructure, communication and raise awareness and vision on developing digital technology to increase sales and business quality. Based on these arguments, we propose the following hypothesis:

Hypothesis H_1: Technology factors positively impact the implementation of digital transformation in the retail industry

Organizational factor

Organizational factors are factors related to how an organization is organized and managed, including organizational structure, work processes, authority and responsibility, division of work, communication methods, corporate culture, and operating rules (Borgman, Bahli, Heier, & Schewski, 2013). Previous studies have shown that organizations have a strong influence on the digital transformation process of enterprises. That influence is based on small criteria such as business strategy, organizational innovation, leadership support, organization size,

finance, human resources, employee training, corporate culture, and applying advanced management standards. To succeed in adopting digital technology and taking advantage of new opportunities, organizations need to change how they operate, improve their processes, and create an agile and innovative environment. Based on these arguments, we propose the following hypothesis:

Hypothesis H_2: Organizational factors have a positive effect on the implementation of digital transformation in the retail industry

Environmental factor

Environment refers to the external factors and conditions surrounding the digital transformation of retail businesses (Izaak et al., 2022). Previous studies show the importance of environmental factors based on many criteria, such as legal policies, customer needs, prices, relative advantages over other businesses, and competitive pressure (Awa & Ojiabo, 2016; Borgman et al., 2013). A favorable and supportive business environment will help retail businesses make the most of the potential of technology and promote growth and success in the digital age. Based on these arguments, we propose the following hypothesis:

Hypothesis H_3: The environmental factors positively affect the implementation of digital transformation in the retail industry.

3.2. Research methods

Measuring instruments: Based on the literature review, the criterion of the research variable is depicted in Table 1.

Table 1 Variable instrument of this research

Variable instrument	Code
Technology	**F1**
Availability of information technology	F1.1
Enterprise's digital transformation infrastructure	F1.2
Quality data, information: Images, prices, product detail	F1.3
Blockchain technology	F1.4
E-commerce and internet communication	F1.5
Information technology security	F1.6
Organization	**F2**
Organization's business strategy	F2.1
Organizational innovation	F2.2
Leadership support	F2.3
Organization scale: national level, city level, district level, etc.	F2.4
Finance of the organization	F2.5
Human resources (labor efficiency)	F2.6
Employee training: Product knowledge, staff readiness, enthusiasm	F2.7
Corporate culture: Traditions, business habits	F2.8
Apply productivity management standards/tools	F2.9
Environment	**F3**
Legal policy: Policy that requires digital transformation with government support	F3.1
Customer needs: Quality, price, product samples, etc.	F3.2
Price, relative advantage over other businesses	F3.3
Competitive pressure with other businesses	F3.4

Analysis method: Analytical Hierarchy Process (AHP) is one of the multi-conditional decision-making methods proposed by Wind and Saaty (1980) and Saaty (1984). AHP is a quantitative method used to evaluate alternatives and select an alternative that satisfies given criteria. The AHP method includes three main steps: analysis, evaluation, and synthesis. The AHP method illustrates the options and alternatives. Then, AHP method suggests choosing the best option that satisfies the needs of the decision-maker. In AHP method, instead of asking for a large amount of data, the AHP method uses expert opinion and doesn't need too much data for analysis. The research interviewed five people who are experts in digital transformation or in the retail industry (see Table 2). Five experts in Table 2 are proffesional in retail industry and own experiences in implementing or consulting digital transformation for firms.

Table 2 List of interviewing experts

No. of interviewer	Position	Qualified/Occupation	Field
No.1	Owner	Digital conversion	Retail supermarket chain
No.2	Lecturer	Economic development	University
No.3	Manager	Strategy and development	Industrial corporation
No.4	Manager	Strategy and development	Retail supermarket chain
No.5	Director	Strategy and development	Manufacturing enterprises

The AHP analysis process includes the following four steps:

Prioritize costs: The research identified the primary goal the decision needs to achieve; then built a comparison matrix to evaluate the priority among the factors. In a matrix, each element represents the importance or priority of one element relative to another. The value in the matrix must reflect the relative precedence among the elements and follow a standard comparison scale, usually from 1 to 9.

Calculate weights for criteria: Using matrix operations, calculate the individual weights for each element based on the comparison matrix. These weights represent the relative importance of the factors to the primary objective. Consistency ratio (CR) must be ensured throughout the application of the method.

$$CR = \frac{CI}{RI}$$

In which, CI is the consistency index and RI is the random index.

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

$$(\lambda_{max} = \sum_{i=1}^{n} wi * \sum_{j=1}^{n} aij)$$

And RI is referred to as the value in Table 3.

Table 3 Random index corresponding to the number of selection criteria with a total of 15 criteria

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51	1.54	1.56	1.57	1.59

Calculating the priority of options according to each criterion: This step calculates the priority for each criterion; the calculation method is the same as the two steps above, but the data included in the evaluation is the result of comparing the level of priority of the options considered according to each criterion. Thus, the researcher has to perform n matrices for n different criteria. As a result, we have n matrices of 1 column m rows. A consistency ratio check should also be performed to ensure that the results obtained have adequate confidence.

Scoring for options and options: This is the final step in the process of evaluating and making options. We concatenate the n 1-column m-row matrices that are the products in Step 3 into the m-row n-column matrix. Multiplying this matrix by 1 column n rows is the result of "*calculate weights for criteria*" step, resulting in a matrix m rows 1 column. The resulting matrix will indicate the best option with the highest result value.

4. Results and discussion

After surveying and using the AHP method, Table 4 shows the summary results of factors affecting digital transformation in the retailing industry in Vietnam. The research results reveal that the technology factor is the most important, followed by the organizational factor, and the environmental factor has the most negligible influence on digital transformation in retail firms.

Table 4 The summary of the interview analysis

Factor	Criteria	Weight of a factor	Weight of criterion - factor	Weight of criterion - total criterion	Order of criterion	Order of factor
Technology	F1.1	0.65	0.15	0.10	3	1
	F1.2		0.14	0.09	4	
	F1.3		0.15	0.10	3	
	F1.4		0.16	0.10	3	
	F1.5		0.23	0.15	1	
	F1.6		0.17	0.11	2	
Organization	F2.1	0.20	0.13	0.03	6	2
	F2.2		0.07	0.01	8	
	F2.3		0.15	0.03	6	
	F2.4		0.09	0.02	7	
	F2.5		0.14	0.03	6	
	F2.6		0.08	0.02	7	
	F2.7		0.10	0.02	7	
	F2.8		0.12	0.02	7	
	F2.9		0.12	0.02	7	
Environment	F3.1	0.16	0.19	0.03	6	3
	F3.2		0.21	0.03	6	
	F3.3		0.29	0.05	5	
	F3.4		0.30	0.05	5	

The finding of this paper is consistent with some previous results of Quyết (2021) and Huong and Phuong (2021). In general, the findings illustrate the vital role of technology in implementing digital transformation in the retail industry. There is a difference in the criteria; however, the criteria have a tiny difference. So the affirmation of the success of digital transformation in the business depends on the technology factor. Based on the analysis results, there are three main factors and 19 sub-criteria affecting the level of digital transformation of retail businesses, with different degrees of influence.

Technology plays the most crucial role in enhancing the implementation and success of digital transformation in the retail industry. This finding requires retailer firms to invest in infrastructure, communication, awareness raising, and vision on developing digital technology to improve business quality and increase sales and performance. The degree of digital transformation depends the most on technological factors such as e-commerce and internet communication criteria. Thus, it is necessary to promote the business scale on social networking sites such as Facebook, Tik Tok, Instagram, and so on because using social media marketing or e-commerce in social

platforms is an effective solution for small and medium firms (Izaak et al., 2022). At the same time, priority should be given to focusing on reputable websites and e-commerce platforms to increase product reliability and ensure quality with customers.

Organizational factors such as business strategy, corporate culture, innovation, leadership, and so on are important factors in the implementation and success of digital transformation that retailer firms have to pay attention to. Digital transformation is not a random and fragmented implementation but needs digital transformation strategies. The success of digital transformation depends on investing in information system capabilities, aligning information systems and business, and developing digital business strategy (Duyen et al., 2023; Osmundsen, Iden, & Bygstad, 2018).

Environmental factor has a more negligible influence on digital transformation than technology and organization. However, it still needs attention and establishment from stakeholders such as the government, professional association, and firms. In digital transformation, many disruptive technologies are new or may not have been regulations governing, such as no official acceptance of cryptocurrencies in Vietnam. Thus, establishing a business environment by the government and associations will help retailer firms' digital transformation process more smoothly.

5. Conclusion

This research analyzes the data from expert surveys about factors affecting digital transformation in the retail industry context. In the 4.0 era, technology is always the dominant factor when doing business. All criteria of the technology factor play a critical role in the digital transformation process, even if there is a difference in importance, it can only be slightly different. This result makes perfect sense, given the results after the survey of experts. The findings of this research contribute to both academic and practical aspects. The results give a framework about determinants of implementing digital transformation as well as provide evidence digital transformation implementation in the Vietnamese retail industry. Digital transformation is increasingly important in retail business because technology is constantly being updated and changing rapidly. The digital transformation process now digitizes how enterprises manage, operate, grow and expand. Therefore, businesses must change and adapt to catch up with the trend, if not, firms will be left behind their competitors. From the above research results, it can be seen that businesses need to focus on technology factors to develop digital transformation in retail businesses. Retail companies must build a digital transformation roadmap for enterprises, clearly define digital transformation goals and strategies, facilitate the connection of capital to automate operational processes, and improve productivity and work efficiency.

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