WILLINGNESS OF DIGITAL TRANSFORMATION OF CHINESE (XIAMEN) ENTERPRISES: TECHNOLOGY ACCEPTANCE MODEL WITH PERCEIVED RISK

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Abstract

This article aims to study the relevant factors that influence the willingness and behavior of digital transformation of enterprises. Whether manufacturing enterprises can realize digital leapfrog development is a question worth pondering. It is imperative to embed digital technology into the traditional manufacturing industry and promote its transformation. We take Xiamen's manufacturing industry as the research object, combined with the actual development of the current enterprises' digital transformation, on the basis of the original technology acceptance model (TAM), adding the variable of perceived risk, and constructs the extended technology acceptance model. We use structural equation model and questionnaire method, and we find that perceived usefulness and perceived ease of use have a positive impact, perceived risk has a negative impact, and perceived usefulness has a mediating effect between perceived ease of use and digital transformation attitudes, and digital transformation attitudes are perceived risk and digital transformation. There is a mediating effect between willingness. The digital transformation attitude produces a positive effect on the digital transformation intention, and the digital transformation intention also produces a positive effect on the digital transformation behavior. Our results provide an insight into the measures to promote digital transformation of enterprises.

Keywords: Digital transformation; technology acceptance model; perceived risk; Chinese enterprise

Introduction

Enterprise digital transformation refers to the process in which enterprises apply digital technology, transform all aspects of production and operation process, and finally promote the transformation of enterprises or organizations. With the increasing development speed of informatization worldwide, enterprise digital transformation has undoubtedly become the inevitable choice for enterprises to adapt to the development of the new digital era. It is imperative to embed digital technology into traditional manufacturing industry and promote its digital transformation. Behavioral attitudes and intentions can promote the occurrence of behaviors, so it is particularly important to explore the factors that affect the attitudes and intentions of enterprises in digital transformation.

Taking the manufacturing industry of Xiamen City as the research object, this paper combined with the actual development of the current enterprise digital transformation, and added the variable of perceived risk on the basis of the original technology acceptance model (TAM) to build the extended technology acceptance model of this study.

Manufacturing enterprises to achieve digital transformation is conducive to saving manpower and material costs, and effectively improve the performance of enterprises. Based on a favorable policy background, it is particularly necessary for decision-makers to improve the willingness of manufacturing enterprises to make digital transformation. Under the above background, this paper takes Xiamen's manufacturing industry as an example, aiming at the digital transformation of manufacturing enterprises, analyzes their willingness and motivation for digital transformation, and clarifies their mechanism of action, for sake of promoting the enterprises' digital transformation and the upgrade provides theoretical and practical basis.

Research Objectives

In order to study the influence factors of enterprises' willingness to digital transformation, to further understand of the formation mechanism of enterprises' digital transformation and upgrading process, we aim to find the answers to research questions, thus, we proposed three research objectives.

1. To figure out the influence factors of enterprises' willingness and attitude towards digital transformation.

2. To construct a SEM including perceived risk to conduct the influence mechanism.

3. To provide reasonable suggestions on accelerating digital transformation of manufacturing enterprises.

Literature Reviews

Many scholars have combined the TAM with other factors or variables to analyze the behavior of individual behaviors. Among them, the research on the combination of perceived risk is also very rich. For example, in order to predict the usage of social network services, Hansen et al. (2018) combined TAM with perceived risk and trust to form a new research model, and their study found that perceived risk and trust play a key role in behavioral decision-making. Similarly, Zhang et al. (2019) incorporate perceived risk into TAM, and their study found that perceived risk will reduce users' intention to use an autonomous vehicle.

H1a: The perceived ease of use of digital technologies positively affects attitudes towards digital transformation.

H1b: Enterprises' perceived ease of use of digital technologies positively affects perceived usefulness.

Alalwan et al. (2016) extended the technology acceptance model with perceived risk and self-efficacy as external factors, and the results showed that behavioral willingness of behavioral individuals was significantly affected by perceived usefulness, perceived ease of use, and perceived risk, and the impact of perceived risk is negative. Kang et al. (2016) discussed the attitudes and intentions of shopping using this technology using mobile phone chatbots and using TAM and innovation diffusion theory. The findings found that perceived usefulness, perceived ease of use, value for price, and trust had positive effects on attitudes and intentions, while perceived risk had the opposite effect.

H2: Enterprises' perceived ease of use of digital technologies positively affects perceived usefulness.

Perceived risk describes the behavioral individual's perception of objective risk in the external environment (Sitkin & Pablo, 1992). This concept was originally proposed by Bauer (1960), who introduced perceived risk from the field of psychology to the fields of economics and management, describing it as an uncertain or unfavorable consequence of a consumer's economic activity that the consumer cannot anticipate. Kidd et al. (1983) believed that perceived risk is dynamic, people's perception of risk is not static, and this perception may produce different perception responses with variations in the environment or the degree of risk. The risk environment also leads people to have different risk attitudes. The research on perceived risk mostly focuses on the analysis of the relationship between the perceived risk of behavioral individuals and behavior willingness, satisfaction, etc., scholars' research has concluded that consumers' perceived risk is negatively related to their willingness and satisfaction (Nazir et al., 2021). Then Featherman & Pavlou (2003) also studied financial risk and combined it with performance risk and social risk.

H3a: Enterprises' perceived risk of digital transformation negatively affects their attitude towards digital transformation.

H3b: Enterprises' perceived risk of digital transformation negatively affects their willingness to digital transformation.

Although lots of researchers have attempted to explore and define the precise connotation of digital transformation, there are still many researches and views in the theoretical circle, and scholars have expounded it from different perspectives. Morton (1991) started the research on digital transformation earlier, and pointed out that the effective introduction and application of digital technology within enterprises will lead to major organizational changes in enterprises. Since then, a variety of researches have emerged focusing on the significant influence of digital technologies on businesses. Subsequently, when studying the medical and health problems of the Internet, Coile (2000) presented the "digital transformation" in a more precise form, after which scholars began to conduct theoretical research on digital transformation. In addition to the micro-level of enterprises, some philosophies also elaborate on digital transformation at the macro-level. For example, Majchrzak (2016) believes that digital transformation could be interpreted as the adoption of digital technology to bring about profound changes in various industries and even the entire society. Research by Valdez-De-Leon (2016) discusses the application of digital

technology in various enterprises in different scenarios, such as improving products, improving business operations, etc. Vial (2019) ‘s research contains eight elements, and proposed that the purpose of digital transformation is to promote organizational change through technological development and progress, so as to achieve organizational performance improvement.

H4: Attitude towards digital transformation positively affects their willingness to digital transformation.

H5: Enterprises’ willingness to digitally transformation positively affects digital transformation behavior.

Conceptual Framework

Based on the technology acceptance theory, we take into account the factor of perceived risk and outline the conceptual framework that affects the attitude and behavior of enterprises in digital transformation, as shown in **Figure 1.**

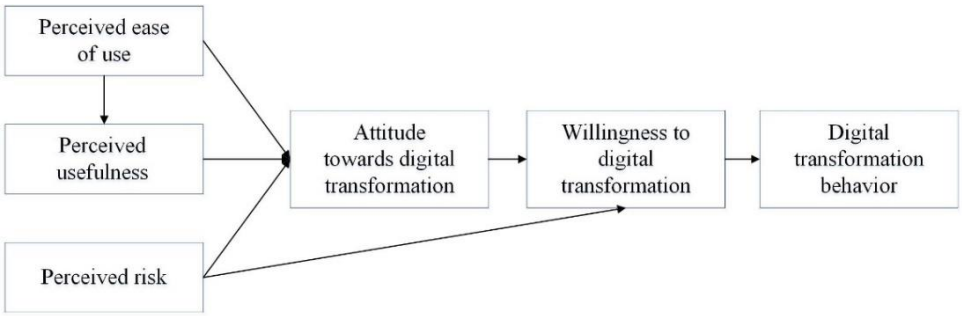

Figure 1: Research Conceptual Framework

According to the research conceptual framework, a total of 5 hypotheses were proposed in our study, as shown in Table 1.

Table 1: Research Hypotheses

No	Hypotheses
H1a	The perceived ease of use of digital technologies positively affects attitudes towards digital transformation.

H1b	Enterprises' perceived ease of use of digital technologies positively affects perceived usefulness.
H2	The perceived usefulness of digital technologies positively affects attitudes towards digital transformation.
H3a	Enterprises' perceived risk of digital transformation negatively affects their attitude towards digital transformation.
H3b	Enterprises' perceived risk of digital transformation negatively affects their willingness to digital transformation
H4	Attitude towards digital transformation positively affects their willingness to digital transformation.
H5	Enterprises' willingness to digitally transformation positively affects digital transformation behavior.

Research Methodology

This study was conducted electronically in Xiamen, Fujian Province, China in June 2022. Our respondents were Senior management, middle management and senior general managers of the manufacturing industry in Xiamen. Due to the lack of corporate members' awareness of the strategic direction of the entire company, this research communicated with the company during the survey and invited representatives of the middle or senior management of the company to complete the survey. A total of 600 questionnaires were returned in the formal survey stage. Taking the manufacturing industry in Xiamen as the research object, we distributed questionnaires to senior management, middle management and senior general manager of each enterprise through Wen Juan Xing, and each enterprise issued a total of three questionnaires. The reason for choosing this group of people is that the managers of the business division have a better grasp of the enterprise strategy.

Therefore, using non-probability sampling as purposive sampling method. We sent three questionnaires to senior managers, middle managers and senior general managers of 200 companies. This study distributes 600 questionaries, collected 440 questionnaires, response rate 73%, and 440 valid

questionnaires are gotten finally after the cancelling of the invalid questionnaires, i.e., the whole questionnaire is filled in regularly. We collate and analyze the collected questionnaire data to prepare for the subsequent empirical research.

For the sake of ensuring the quality of the obtained data, we screened the questionnaires, including the following screening principles. First, the questionnaire must be completed completely, that is, all questions in the questionnaire must be answered. Second, the filling time of the questionnaire should not be less than two minutes to prevent the phenomenon of answering the questionnaire too hastily.

Results

We conducted confirmatory factor analysis on the formal survey data to calculate its reliability and validity data. Before performing hypothesis testing, reliability and validity analysis of the data is required. Reliability reveals whether each group of measurement questions in the scale can reflect the same construct. In this study, Cronbach's Alpha and combined reliability (CR) were used to test the reliability of the model, and the software SPSS 22.0 and AMOS 24.0 was applied to calculate the reliability and validity of our research. It can be seen from Table 2 that the Cronbach's Alpha and CR values of each latent variable are greater than 0.7, and the model has good internal consistency and good reliability, which can be further analyzed. The AVE values of each latent variable in Table 2 are all greater than 0.5, revealing that each latent variable has good convergent validity. It can be seen from Table 3 that the square root of the AVE value between each latent variable is greater than the correlation coefficient between the variable and other variables, so our survey has an ideal discriminant validity.

Table 2: Reliability and convergent validity analysis

Factor	Measure item	Standard factor loadings	UnEst	S.E	Z	P	CR	AVE	Cronbach's Alpha
PEU	PEU1	0.630	1.000				0.833	0.629	0.927
	PEU2	0.838	1.225	0.088	13.992	***			

	PEU3	0.888	1.282	0.089	14.392	***			
PU	PU1	0.875	1.000				0.872	0.694	0.904
	PU2	0.832	0.866	0.042	20.835	***			
	PU3	0.790	0.843	0.043	19.458	***			
PR	PR1	0.995	1.000				0.871	0.715	0.825
	PR2	0.992	0.987	0.059	12.189	***			
	PR3	0.414	0.612	0.054	9.544	***			
AT	AT1	0.808	1.000				0.887	0.723	0.887
	AT2	0.885	1.104	0.050	22.017	***			
	AT3	0.856	1.040	0.050	21.006	***			
WI	WI1	0.815	1.000				0.878	0.706	0.856
	WI2	0.839	0.993	0.048	20.583	***			
	WI3	0.866	1.050	0.049	21.534	***			
BE	BE1	0.930	1.000				0.749	0.517	0.732
	BE2	0.690	0.801	0.049	16.489	***			
	BE3	0.458	0.814	0.062	9.895	***			

Table 3: Analysis of discriminant validity results

	PEU	PU	PR	AT	WI	BE
PEU	0.793					
PU	0.727	0.833				
PR	0.641	0.570	0.846			
AT	0.636	0.483	0.620	0.850		
WI	0.654	0.492	0.607	0.749	0.840	
BE	0.600	0.577	0.844	0.603	0.533	0.719

We analyze the corresponding relationship between each factor and the item through the factor load coefficient value. The data in this study were rotated using the maximum variance rotation method (varimax) in order to find out the corresponding relationship between factors and study items. The table below shows the information extraction of research items by factors and the corresponding relationship between factors and research items. As can be seen from the table above, the common degree value of all research items is higher than 0.4, which means that there is a strong correlation between research items and factors, and factors can effectively extract information. After ensuring that the factor can extract most of the information of the research item, the corresponding relationship between the factor and the research item is analyzed. The results are shown in appendix.

Table 4 shows that the absolute values of the critical proportions of all paths in the model in our research are greater than 1.96, and the P value is less than 0.05. The proposed research hypotheses are all supported. Perceived ease of use will significantly and positively affect digital transformation attitudes; Perceived usefulness significantly positively affects digital transformation attitudes; Perceived usefulness produces a positive impact on perceived usefulness, and passed the significance test; Perceived risk has a significant negative impact on both digital transformation attitudes and digital transformation willingness; Digital transformation attitude produces a significant positive effect on digital transformation willingness, and further, this willingness will have a significant positive effect on behavior.

Table 4: Path coefficients and hypothesis testing results

	Estimate	S.E.	C.R.	P	Hypothesis	Test
AT←PEU	0.296	0.058	5.086	***	H1a	support
AT←PU	0.206	0.054	3.807	***	H2	support
PU←PEU	0.773	0.048	16.165	***	H1b	support
AT←PR	-0.305	0.090	-3.403	***	H3a	support
WI←PR	-0.157	0.065	-2.417	***	H3b	support
WI←AT	0.833	0.058	14.453	***	H4	support
BE←WI	0.398	0.052	7.702	***	H5	support

This study uses the SPSS mediation effect model of Hayes (2012) to test the mediating effect of perceived usefulness and digital transformation attitudes. The test results are shown in Table 5 and Table 6. The results of this study verify the existence of two intermediary paths.

Table 5: Mediating role of perceived usefulness

Variable		Fit index		Coefficient significance	
Outcome variable	Predictor variable	R^2	F	B	t
AT		0.366	241.560		
	PEU			0.574	15.544***
PU		0.451	343.239		
	PEU			0.727	18.527***
AT		0.432	158.437		
	PEU			0.303	6.935***
	PU			0.354	7.492***

Table 6: The mediating role of attitudes towards digital transformation

Variable		Fit index		Coefficient significance	
Outcome variable	Predictor variable	R^2	F	B	t
WI		0.396	175.491		
	PR			-0.471	-13.247***
AT		0.365	240.306		
	PR			-0.554	-15.502***
WI		0.660	404.819		
	PR			-0.075	-2.403**
	AT			0.715	21.141***

Discussions

In this paper, an extended TAM is constructed under the premise of considering the perceived risk factors, which has certain innovative significance for the extended application of the technology acceptance model. There are less existing studies on the willingness of enterprises to transform into technology, and even fewer researches combine relevant factors in the field of psychology with theoretical models that explain individual behaviors. This paper regards attitudes, intentions, and behaviors as interrelated relationships, incorporates

perceived risk into the TAM model, and explores the factors that influence the digital transformation of enterprises. We use questionnaires to obtain relevant data, and draw conclusions by testing structural equation models, providing a new perspective for future research.

The main findings of our research serve the research problems, and the influence mechanism of perceived ease of use, perceived usefulness, perceived risk on Enterprise's digital transformation attitude, willingness and behavior. Our discussion of empirical results are as follows.

H1a: The perceived ease of use of digital technologies positively affects attitudes towards digital transformation.

H1b: Enterprises' perceived ease of use of digital technologies positively affects perceived usefulness.

According to the above path analysis, enterprises' perception of the ease of use of digital transformation will have a positive impact on enterprises' willingness to digital transformation, and works through two paths. The two paths are perceived ease of use - willingness to digital transformation, perceived ease of use - perceived usefulness - willingness to digital transformation. Both of these hypothetical relationships are validated by structural equation modeling, and perceived usefulness plays a mediating role between perceived ease of use and willingness to digital transformation, which is validated by us. When an enterprise feels that it is not difficult to introduce digital technology, its employees can easily master the application of digital technology, and members of the enterprise will think that the digital transformation of the enterprise is the right decision, and they are willing to learn and use these new technologies. When the system for the application of new technologies is simplified as much as possible, the satisfaction of enterprise members and customers can be improved.

H2: The perceived usefulness of digital technologies positively affects attitudes towards digital transformation.

According to the above path analysis, companies' perception of the usefulness of digital transformation will produce a positive effect on their attitude towards digital transformation. When the members of the enterprise feel

that the introduction of digital technology can provide the functions they need to operate, and these functions are useful, then the digital transformation of the enterprise is a wise idea, and is willing to use digital technology to continue daily operations. Our conclusions are consistent with those of Nazir et al. (2021) and Hsieh et al. (2016).

H3a: Enterprises' perceived risk of digital transformation negatively affects their attitude towards digital transformation.

H3b: Enterprises' perceived risk of digital transformation negatively affects their willingness to digital transformation.

New Knowledges

It perceived usefulness and perceived ease of use have a positive impact, perceived risk has a negative impact, and perceived usefulness has a mediating effect between perceived ease of use and digital transformation attitudes, and digital transformation attitudes are perceived risk and digital transformation. There is a mediating effect between willingness.

The digital transformation attitude produces a positive effect on the digital transformation intention, and the digital transformation intention also produces a positive effect on the digital transformation behavior.

Conclusions

In the path analysis, it is not difficult to find that enterprise members' perception of the risk of digital transformation will have a negative impact on the attitude of digital transformation. Enterprises' perception of the risk brought by digital technology produces a negative effect on the willingness of digital transformation, and it works through two paths. These two paths are perceived risk—willingness to digital transformation, perceived risk - attitude towards digital transformation - willingness to digital transformation. Both of these impact paths are verified by structural equation modeling, and the attitude towards digital transformation is a mediating role between perceived risk and willingness to digital transformation, and the mediating effect is also verified above. Many scholars have found in their own research that behavioral individuals' perception of risk will have a certain hindering effect on the promotion of new technologies (Li & Huang, 2009; Wu & Ke, 2015). When

enterprises believe that using digital technology to operate will cause economic losses, social losses, time losses, etc., enterprises will think that digital transformation is a wrong decision, and they will not be willing to digital transformation. And the greater the perceived risk, the lower the attitude and willingness to undertake digital transformation. In addition, this risk perception is also closely related to the trust in certain new technologies and new technologies. When the perception of risk is small, the trust will be stronger; Conversely, when the perception of risk is high, trust is weaker.

H4: Attitude towards digital transformation positively affects their willingness to digital transformation.

H5: Enterprises' willingness to digitally transformation positively affects digital transformation behavior.

The attitude of enterprises to digital transformation will give a positive effect on digital transformation intention. This hypothesis was also verified by structural equation modeling. When companies feel that introducing digital technologies for digital transformation is a wise decision, companies will naturally be willing to apply some new digital technologies to conduct business transactions. We propose the following.

Increase the usefulness of digital technologies: At present, we-media is a very infectious force, and we can also use the we-media to enhance the awareness of digital transformation of various enterprises. Offline publicity can allow enterprises to experience the powerful functions of digital technology in a more direct way, and let the technical staff of the enterprise or the customers of the enterprise personally operate the system introduced with digital technology, etc., create publicity opportunities, and strive to make enterprises feel the convenience of digital transformation. In addition, the industrial cluster development plan is conducive to the sustainable development of the industry and exerts more powerful functions of digital technology.

Improve the ease of use of digital technology: Establish and improve relevant policies and regulations, promote the aggregation of data resources, optimize the value space of the entire life cycle of industrial enterprises, promote the transformation of enterprise business models, optimize and simplify service methods, so as to accelerate the digital transformation of the entire

process of manufacturing enterprises. Enterprises should formulate incentive policies for talents. In addition, enterprises should be guided to strengthen the management and investment of industrial and technical human resources, improve and optimize the traditional human resource management model and bonus incentive mode.

Reduce risk perception of digital technologies: relevant management personnel should be made to enhance risk vigilance. Over-trust and development of emerging technologies should not lead to insufficient early warning of possible risks, which may lead to serious consequences. If there is an algorithm error in the system or a malicious network attack occurs, the business system of the enterprise will give wrong feedback, and the consequences will be uncontrollable, so this also requires managers to be vigilant.

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