A Study on the Influencing Factors of Digital Governance Capacity Based on Technology Acceptance Model

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Abstract: Building a digital government in China presents new opportunities and challenges in the context of the technological revolution. It is fundamental for Internet power and digital China strategy, supporting innovative governance concepts, forming a new pattern of digital governance and promoting a service-oriented government. This paper focuses on factors that influence public willingness to use digital government technologies. By integrating innovation diffusion theory with the technology acceptance model framework, a research model is constructed, and data from 314 questionnaires are used for empirical testing. Results show that the model can explain 42% of public behavioral intention to use digital government technologies, providing new ideas for subsequent promotion.

Keywords: digital government; technology acceptance model; innovation diffusion theory; structural equation modelling

1 Introduction

The Chinese government's digital governance system has been continuously improved, and digital management tools have been widely used in government agencies, improving the efficiency of government affairs and the level of management. However, there is still some room for the development of digital government construction in China, and there are still some problems to be improved, such as weak system and mechanism and poor data connectivity. The purpose of this paper is to explore how to match online governance with public technology needs, so that technology can return to human nature, meet user needs, and promote the development of digital government. The study focuses on two main issues: to what extent the technology acceptance model explains individuals' willingness to participate in digital governance, and the ways and effects of information technology in digital government to attract public participation.

Based on extensive reading and summarizing relevant literature at home and abroad, the paper draws on the technology acceptance model and combines it with the theory of diffusion of innovations to construct a model for studying the public's attitude towards digital government

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technology, analyzing the main factors affecting users' adoption and sustained use behaviors, to provide a more comprehensive explanation of the governance capacity of digital government.

2 Related Works

2.1 Relevant overview of innovation diffusion theories

Diffusion of innovation refers to the process of spreading and popularizing an innovation in a social system, which is a dynamic, continuous, and non-linear process involving different types of members and roles in the social system. Rogers defines diffusion of innovation as the process of spreading in a certain way over time among various members of a social system, and divides this process into five stages: the understanding stage, the interest stage, the evaluation stage, the experimentation stage, and the adoption stage[1]. Among these, the adoption stage is considered to be the most important as it determines whether the innovation will be accepted, used, and sustained. It is proposed that members of the social system's perceptions and evaluations of the innovation influence whether they adopt it or not, and five characteristics influence the rate and extent of adoption: relative advantage, compatibility, complexity, trialability, and observability. Rogers' theory has been validated in a number of neighborhoods, such as journalism and communication[2], education[3], management[4], and many others.

The Diffusion of Innovations Model is a model that studies and generalizes the adoption of innovations by various types of people. The main theoretical guideline of the model is that when confronted with innovations, individuals will have different mindsets and behavioral patterns and cannot be included in the same category at the same time. This model is often applied to estimate the market share of a new technology or product. Some early adopters of an innovation tend to experiment and adopt the latest technology, while others need more information and time to decide whether to adopt it or not. Bikhchandani's theory of information cascading explains the rapid diffusion of innovations through the influence of others' decisions[5]. Valente's social network threshold model integrates diffusion of innovations theory, highlighting the role of social relationships and communication in predicting innovation diffusion patterns and identifying leaders and followers[6]. Li Zhuomeng developed a two-way probabilistic model of individual users in innovation decisions, drawing from social network theory to explore innovation diffusion influences[7]. Feng Ying and Xu Zhandong analyzed internal and external factors in enterprises, finding that internal leadership support is crucial for e-commerce innovation diffusion, while competitive pressure from partners stimulates the process.[8].

2.2 Review of Technology Acceptance Models

Both the Social Cognitive Theory[9] and the Theory of Rational Behavior[10] emphasize subjective judgments and external influences on behavior. Fred Davis combined these theories to propose the Technology Acceptance Model, which explains users' behavior towards adopting and using information technology based on perceived usefulness and ease of use[11].The model has been validated by examining computer use behavior. It is an indicator for assessing people's ability to assimilate new technologies based on social psychology and decision science[12].

The Technology Acceptance Model (TAM) is based on two main factors: perceived usefulness and perceived ease of use, which are used to assess people's attitudes towards and acceptance of technology[13]. TAM also includes other factors that may influence a person's decision to accept a new technology, such as social factors, cultural environments, and personal traits. Nowadays, TAM is widely used to study the adoption and usage behavior of new technologies, especially in the field of computer, internet, and mobile technologies. Researchers have made improvements to TAM, such as extending the influencing factors to include subjective norms, perceptual behavioral control, and cognitive instrumentality[14], and adding social influence and mental process factors to create an extended model called UTAUT[15]. By modifying and extending TAM, researchers have developed new models to predict technology adoption in various fields, including urban services[16] and digital government[17]. The government can use TAM to analyze user attitudes and adoption behaviors toward digital public services to improve the overall level of public services according to the needs of different users [18]. TAM is suitable for explaining the psychological and social factors of users' adoption of new technologies across cultures, providing guidance for the study of public management issues in the digital era[19].

2.3 An overview of the relevant aspects of digital government governance

Today, ICT plays a crucial role in economic and social development, transforming various aspects of society, work, business, and government[20]. E-technology and ICT-enabled solutions are revolutionizing governance in the public sector. However, it is important to ensure that citizens can effectively access and utilize government services through IT and express their opinions and demands. The digital divide caused by differences in technology ownership and application can limit e-government implementation[12].

Social media applications expand the use of ICT in the public sector, increasing transparency, engagement, and collaboration[13]. Governments can leverage social media and user-generated content to improve service delivery and communication with citizens[21]. It is crucial to distinguish between the overall service relationship and specific events within the service[22]. Allocation of financial resources for digital government initiatives should consider the satisfaction of government employees[16]. The adoption of ICT may vary across cultures, and barriers to adoption should be taken into account, as suggested by Carter[23]. Social media has the potential to promote participatory democracy but should be approached cautiously due to its disruptive nature[24].

2.4 Literature review

The development of digital government in China can be traced back to the mid-to-late 1990s. With the development of information technology and the advancement of national digital government construction, the academic community began to focus on the field of digital government. The government issued the Strategic Outline for the Development of Digital Government Construction (2021-2025), emphasizing the need for digital government to provide better services for the people and economic and social development. Research in academia has focused on the digital transformation of government and digital governance.

Still, the main body of digital government governance should be the cooperation between the government and the public. Digital government governance aims to improve the efficiency and quality of public services through digital technology and to promote government-citizen interaction and participation. The government is responsible for formulating policies and plans to ensure that digital government governance is in line with the country's overall development goals and to enhance citizens' oversight of the government. The public should actively participate in digital government governance by providing feedback and engaging in public services to improve the sustainability and promotion of digital government governance. Therefore, this paper measures the current stage of digital government governance capacity from the public's perspective, filling a research gap in this area.

The technology acceptance model, first proposed by Professor Davis in 1986, has been widely used to explain the process of information technology and has undergone tremendous development over the past few decades. The continuous addition of factors and variables such as social factors, cultural differences, and technology use has made the model more comprehensive, better able to explain people's attitudes towards the use of new technologies and the adoption process, and generally improved the explanatory validity of the technology acceptance model. In recent years, the growing prevalence of information technology across diverse domains has led to increased scholarly investigation of the technology acceptance model within domestic academic circles. Scholars such as Lu Yaobin[25], Gao Furong[26], and Bian Peng[27] have reviewed and commented in detail on the development history, theoretical assumptions, variable composition, and application scope of the technology acceptance model from different perspectives and levels. On this basis, this study attempts to apply the technology acceptance model to the field of public management to explore the influencing factors of the public's intention to use digital government services, which provides new theoretical support and practical reference for related studies in China.

3 Modelling

Based on the technology acceptance model, this study combines the four variables of relative advantage, complexity, observability, and compatibility with the innovation diffusion theory. Among them, relative superiority, complexity, and observability are used as external factors, and compatibility is used as an internal factor. **Figure 1.** shows the integration research model.

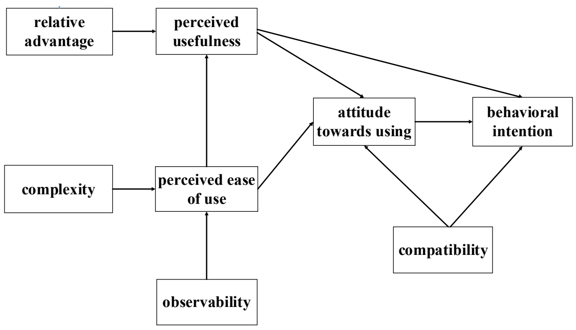

Fig. 1. Diagram of the model for this study.

3.1 Research hypotheses

This study follows the classical framework proposed by Davis and offers the following hypothesis.

H1: Attitude towards using is influenced by the perceived ease of use in a positive manner.

H2: Attitude towards using is influenced by the perceived usefulness in a positive manner.

H3: Perceived usefulness is influenced by the perceived ease of use in a positive manner.

H4: Behavioral intention is influenced by the perceived usefulness in a positive manner.

H5: Behavioral intention is influenced by the attitude towards using in a positive manner.

In economic life, the consumer choice behavior of individuals is affected by the characteristics of the product itself. Based on existing research, we take the technology acceptance model as the basis, takes the technology features as external variables, and believes that the three aspects of technology features, namely, relative advantage, complexity, and observability, will affect the public's perceived usefulness and perceived ease of use. User acceptance is the process of user awareness development. People's first experience using a new technology often comes from existing values, past experiences, and current needs. On this basis, people share their experiences and insights through formal organisational channels and informal communication networks, and gradually develop a common knowledge and understanding of the technology. This paper identified compatibility as an internal factor influencing public attitudes and behavioral intentions to use it. Accordingly, the following hypothesis is proposed:

H6: The perceived usefulness is influenced by the relative advantage in a positive manner.

H7: The perceived ease of use is influenced by the complexity in a positive manner.

H8: The perceived ease of use is influenced by the observability in a positive manner.

H9: The attitude towards using is influenced by the compatibility in a positive manner.

H10: The behavioral intention is influenced by the compatibility in a positive manner.

3.2 Questionnaire design

The questionnaire of this study consists of the following eight major sections: Part I measures the perceived usefulness of digital government technologies. Part II measures the perceived ease of use of digital government technology. Part III measures public attitudes towards the use of digital government technologies. Part IV measures the public's intention to use digital government technology. Part V measures the relative superiority of digital government technologies. Part VI measures public compatibility with digital government technologies. Part VII is a complex measure of digital government technology. Part VIII is an observability measure of digital government technology.

At the beginning of the questionnaire, we explained in detail the purpose of the research and the method of completion, while ensuring that questionnaire data was for the sole use of the thesis research. To measure the respondents' attitudes towards certain opinions or statements, the questionnaire used a measurement scale of Likert's five-point scale. The hierarchy consists of 5 levels where level I means strongly disagree and level V means strongly agree.

In this section, we designed questions corresponding to each variable based on established research scales as **Table 1.**

Table 1. Variable measurements and sources.

Variables	Measurement Indicators	Label	References
Perceived Usefulness	Digital government can improve the efficiency of public enquiry	Q1	Davis (1989)
	Digital government can make it less difficult for the public to participate in political questioning	Q2	
	Digital government can solve more problems	Q3	
Perceived Ease of Use	The model of digital government should be simpler	Q4	Davis (1989)
	The procedural steps of digital government should be much less difficult to learn	Q5	
	Digital government should be easier to operate	Q6	
Attitude	I'm bullish on the future of digital government technology adoption	Q7	Davis (1989)
	I am willing to use digital government technology	Q8	
	There is a need to optimize the traditional way of asking questions about politics through new technologies	Q9	
Behavioral Intention	I will report any problems in my life to the proper authorities	Q10	Davis (1989)
	I will take the initiative to learn about technologies that change the way we live our daily lives	Q11	
	I prefer to solve problems online rather than offline in person	Q12	
Relative Advantage	Digital government technology is more capable of protecting individual privacy	Q13	Rogers (2010)
	Digital government technology is more open and transparent	Q14	
	Digital government technology is more cost effective in terms of human and material resources	Q15	
Compatibility	I am able to use my smartphone fluently	Q16	Rogers (2010), McKenzie (1999)
	I have a better understanding of the ways and means of public enquiry	Q17	
	I'm confident that I'm proficient at doing online questioning	Q18	
Complexity	I have a good understanding of the scope and areas of responsibility of the online inquiry	Q19	Rogers (2010), Wejnert (2002), Yang (2007)
	I don't think there is a large learning cost for learning to ask questions online	Q20	
	The electronic equipment I currently use is sufficient to support the use of this technology	Q21	
Observability	Someone around me has successfully reported issues to relevant departments online	Q22	Rogers (2010)
	Digital government technology is more heavily publicized around me	Q23	
	I've seen videos/pictures/text online encouraging the public to use digital government technology	Q24	

4 Data Analysis

4.1 Distribution and return of questionnaires

This study was conducted in the form of online questionnaires, with a total of 322 questionnaires recovered, and a total of 314 valid questionnaires after excluding those that were not filled out in a standardised manner.

4.2 Descriptive statistical analysis of the sample

A total of 314 valid questionnaires were returned. The results of the descriptive statistical analysis are shown in the **Table 2.**

Table 2. Results of descriptive statistical analysis of the sample.

Label	Count	Average	Standard Deviation	Variance	Skewness	Kurtosis
Q1	314	3.73	0.930	0.864	-0.822	0.503
Q2	314	3.30	0.985	0.971	-0.307	-0.004
Q3	314	3.16	1.024	1.048	-0.306	-0.174
Q4	314	3.82	0.928	0.860	-0.809	0.632
Q5	314	3.78	0.962	0.926	-0.673	0.193
Q6	314	3.84	0.964	0.929	-0.833	0.527
Q7	314	3.89	0.994	0.988	-0.817	0.173
Q8	314	3.90	1.008	1.016	-0.856	0.237
Q9	314	3.92	0.986	0.972	-0.853	0.287
Q10	314	3.91	0.891	0.794	-0.893	1.018
Q11	314	3.89	0.915	0.837	-0.905	0.947
Q12	314	3.89	0.892	0.796	-0.866	0.916
Q13	314	3.96	0.955	0.912	-1.041	1.219
Q14	314	4.02	0.894	0.798	-1.065	1.526
Q15	314	3.96	0.945	0.893	-1.009	1.147
Q16	314	3.84	1.056	1.114	-0.672	-0.232
Q17	314	3.87	1.048	1.098	-0.676	-0.253
Q18	314	3.84	1.059	1.123	-0.644	-0.248
Q19	314	3.83	0.960	0.922	-1.087	1.168
Q20	314	3.96	0.939	0.882	-1.078	1.150
Q21	314	3.73	.923	0.852	-1.050	1.240
Q22	314	4.04	0.972	0.944	-1.275	1.534
Q23	314	4.02	0.984	0.968	-1.281	1.521
Q24	314	4.04	0.970	0.941	-1.253	1.465

4.3 Reliability and validity tests

In this paper, to judge the consistency of the questions, we used Cronbach's alpha analysis. It is generally believed that Cronbach's coefficient is more significant than 0.7 indicates that the reliability of the questionnaire is good, between 0.35 and 0.7 is in the acceptable range, and lower than 0.35 indicates that the questionnaire is less reliable and unacceptable. The specific results are shown in **Table 3.**

Table 3. Results of reliability analysis for each variable.

Factor	Count	Label	Factor Loading	AVE	CR	Cronbach's α	Value of α after deletion
Perceived Usefulness	3	Q1	0.833	0.6743	0.8609	0.867	0.821
		Q2	0.872				0.748
		Q3	0.754				0.857
Perceived Ease of Use	3	Q4	0.847	0.6701	0.8588	0.860	0.786
		Q5	0.832				0.768
		Q6	0.775				0.854
Attitude towards Using	3	Q7	0.704	0.5205	0.7650	0.792	0.727
		Q8	0.737				0.709
		Q9	0.723				0.715
Behavioral Intention	3	Q10	0.864	0.5873	0.8089	0.820	0.688
		Q11	0.702				0.791
		Q12	0.723				0.773
Relative Advantage	3	Q13	0.816	0.5605	0.7919	0.790	0.673
		Q14	0.741				0.713
		Q15	0.683				0.755
Compatibility	3	Q16	0.655	0.5112	0.7574	0.754	0.713
		Q17	0.773				0.614
		Q18	0.712				0.683
Complexity	3	Q19	0.714	0.5693	0.7984	0.801	0.730
		Q20	0.767				0.666
		Q21	0.781				0.784
Observability	3	Q22	0.780	0.6357	0.8393	0.838	0.801
		Q23	0.850				0.735
		Q24	0.759				0.786

As a preliminary step in assessing the measurement model, reliability analyses tested the correlation and regression of the questionnaire. According to **Table 3**, it can be seen that the factors CR > 0.60 [28], Cronbach's α > 0.70 and AVE > 0.50 [29] and the value of α after deletion decreased, which indicates that the questionnaire data has a high level of reliability.

This paper analyses structural validity to correctly validate the extent of the theoretical conceptualisation, using the KMO sample measure and Bartlett's sphere test to test the correlation between the questions. The specific results are presented in **Table 4.**

Table 4. Results of factor analysis by dimension.

Factor	Label	Explained variance score	KMO	Approx. Chi-Square	df	Sig
Perceived Usefulness	Q1 Q2 Q3	79.262%	0.704	488.936	3	0.000
Perceived Ease of Use	Q4 Q5 Q6	78.188%	0.721	446.308	3	0.000
Attitude towards Using	Q7 Q8 Q9	70.601%	0.708	276.270	3	0.000

Behavioral Intention	Q10 Q11 Q12	73.612%	0.698	343.473	3	0.000
Relative Advantage	Q13 Q14 Q15	70.469%	0.699	279.080	3	0.000
Compatibility	Q16 Q17 Q18	67.053%	0.682	226.727	3	0.000
Complexity	Q19 Q20 Q21	71.593%	0.692	305.172	3	0.000
Observability	Q22 Q23 Q24	75.530%	0.718	375.728	3	0.000

Results show that KMO is 0.912, which is suitable for factor analysis. The approximate chi-square concomitant significance probability of Bartlett's sphere test is 0.000, which is less than 0.01, indicating that the data are spherically distributed, and the variables are pretty independent of each other, which makes them suitable for factor analysis. Explained variance score is 64.051% and all factor loadings are more significant than 0.5, indicating that the questionnaire design has good structural validity.

4.4 Model testing

Confirmatory factor analysis (CFA) verifies how each dimension is associated with the target variable and is the first step used to assess the reliability and validity of models constructed based on established theories. CFA is a restricted factor analysis that defines which items are loaded on each factor, meaning that items are not free to be loaded on non-target variables[30]. Next, the hypothesized links in the constructed model are verified using path analysis to determine the correlation and strength of their relationships. Structural equation model allowed for the estimation of numerous relevant dependencies between possible constructs with multiple indicators. Finally, structural equation models were built using AMOS 24 software and analysed using maximum likelihood estimation to derive standardised path coefficients.

With p of less than 0.05, the chi-square value of the model in this study was 763.465; however, since the chi-square value is sensitive to the sample size, other overall model fit indices must be considered when deciding whether to accept the model. The GFI, CFI, TLI, IFI, CMIN/DF, and RMSEA were used to estimate the appropriateness of the model from the results of the model fit. The results showed GFI = 0.832, CFI = 0.867, TLI = 0.848, IFI = 0.868, CMIN/DF = 3.168, and RMSEA = 0.083.The overall model fit was judged to be in the good range based on the thresholds recommended by Hu and Bentler[31]. In addition, the model explained 42% of the behavioral intentions. **Figure 2.** shows the results of the model.

There are ten hypotheses in the model, and eight of them were confirmed. The significance tests of H8 and H10 had an error rate of findings higher than 5%, which is in the unacceptable category. The specific results are presented in **Table 5.**

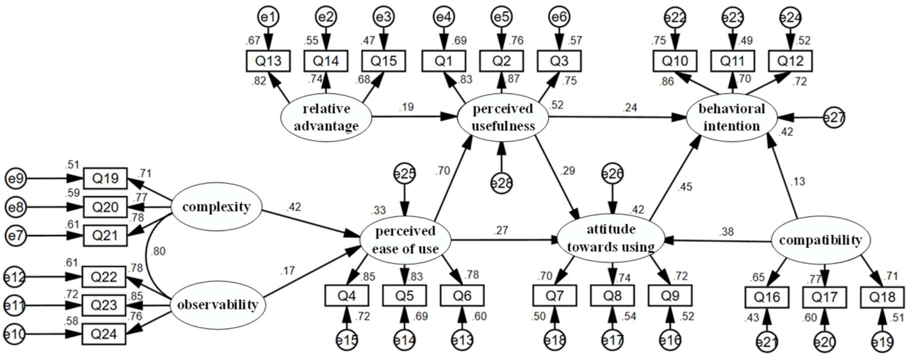

Fig. 2. Results of the extended technology acceptance model.

Table 5. Results of testing model assumptions.

Number	Hypothetical Relationship	Standardized coefficient	p	Verification results
H1	Perceived Ease of Use → Attitude towards Using	0.098	**	supported
H2	Perceived Usefulness → Attitude towards Using	0.092	**	supported
H3	Perceived Ease of Use → Perceived Usefulness	0.071	***	supported
H4	Perceived Usefulness → Behavioral Intention	0.071	***	supported
H5	Attitude towards Using → Behavioral Intention	0.098	***	supported
H6	Relative Advantage → perceived usefulness	0.061	**	supported
H7	Complexity → Perceived Ease of Use	0.135	**	supported
H8	Observability → Perceived Ease of Use	0.131	0.179	unsupported
H9	Compatibility → Attitude towards Use	0.068	***	supported
H10	Compatibility → Behavioral Intention	0.075	0.095	unsupported

Note: ***, **, and * indicate P<0.001, P<0.01, and P<0.05, respectively.

5 Conclusions

Based on extensive literature review and investigation of public use of digital government technology, this paper aims to explore the influencing factors of digital government governance capability. By integrating the Innovation Diffusion Theory with the TAM (Technology Acceptance Model), a conceptual model for the research is formed. Despite the continuous advancement of academic research, the classic technology acceptance model remains applicable. The study found that the impact of observability on perceived ease of use and compatibility on behavioral intention has not been tested. Finally, the study proposed five paths influencing the public's use of digital government technology: relative advantage → perceived usefulness → behavioral intention, relative advantage → perceived usefulness →

attitude towards use → behavioral intention, complexity → perceived ease of use → attitude towards use → behavioral intention, complexity → perceived ease of use → perceived usefulness → attitude towards use → behavioral intention, compatibility → attitude towards use → behavioral intention. This paper is based on the Innovation Diffusion Theory and the Technology Acceptance Model, aiming to provide new insights and directions for the subsequent promotion and implementation of digital government technology through an investigation of Chinese citizens' usage of such technology. For this purpose, we propose the following policy: First, promote inter-regional linkage and collaboration through the construction of integrated government service platforms. Second, strengthen data governance, promote data openness, and provide incentives for data sharing among different regions. Third, optimize institutional norms to enhance the credibility of digital government. Fourth, strengthen talent development to enhance the autonomy of digital government.

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