Research on influencing factors of elderly Douyin adoption and Use behavior: based on Diffusion of innovations theory and Uses and Gratifications theory

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Abstract. The Douyin platform is popular among users of diverse ages, including the elderly. This study utilized the diffusion of innovations theory and the uses and gratifications theory to analyze the factors that influence the aged population's adoption and use of Douyin and to provide relevant improvement suggestions and marketing strategies. A questionnaire survey was conducted among 400 Douyin users who are 60 years or older in Beijing, and the data were analyzed using SPSS and AMOS. The study found that relative advantage, compatibility, complexity, entertainment, and self-expression are significant, whereas trialability, observability, and interpersonal maintenance are insignificant. Through this research, the Douyin platform can better understand the needs of the ageing population and provide more tailored products and services. Additionally, other institutions can also refer to these marketing strategies and suggestions to better serve the ageing population.

Keywords: older adults; Douyin, adoption and use, innovation, demand

1 Introduction

Launched in 2016, Douyin is a platform that enables the creation, discovery, and sharing of short videos, with over 600 million users as of August 2020, and has become a global phenomenon social networking application (Li&Ran, 2021) [1]. Its social and entertainment attributes are increasingly influencing people, and Using Douyin has become a common practice for many.

In this paper, we focus on the older adult demographic to study the impact of the adoption and usage factors of Douyin, exploring how they adjust to the digital society, and bridging the "digital divide."Previous studies on new media user adoption and usage behavior are primarily based on the Technology Acceptance Model (TAM), the Theory of Planned Behavior (TPB), and the Innovation Diffusion Model (IDT), with a combination of two models to develop an extended technology adoption model(Mun, Joyce & Jackson , 2006; Xu & Gao, 2006; Geng, 2007)[2][3][4].

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However, these studies mainly overlook the factor of users' own need motivation, which is another major motivation that drives them to use mobile services or technologies. Therefore, this study utilizes the diffusion of innovation theory and the use and satisfaction theory to construct a more inclusive research model on the user adoption and use behavior. The research aims to explore the factors that influence the adoption and use of Douyin among older adults, taking into consideration the importance of the need for entertainment as a motivational factor. The output of this study may help government departments to develop more age-friendly measures to bridge the "digital divide."

2 Literature Review

2.1 Older people

In China, the Law on the Protection of the Rights and Interests of the Elderly defines the age threshold for older people as 60 years old.

2.2 Douyin

In 2017, the development of Douyin, a short video platform in China, gained momentum. Following which, its parent company launched Tik Tok, an international version of Douyin.

2.3 Adoption and use

User behavior generally consists of two stages: following and registering accounts, and subsequent use of information, such as sharing it. These two stages refer to the user adoption and use behavior in communication science.

2.4 Diffusion of Innovation Theory

The theory of diffusion of innovation was proposed by Rogers in the 1960s, which revolves around the idea of persuading people to accept new products, ideas, or things through media, emphasizing the impact of mass media on society and culture. Rogers defined innovation diffusion as a fundamental social process. Perceived characteristics are users' personal perception of the innovation's characteristics. Rogers divided their perceived characteristics into five dimensions, namely relative superiority, compatibility, ease of use, trialability, and observability. (Rogers, 2002) [5]. Table 1 shows Definition of innovation characteristic variables.

2.5 Uses and Gratifications Theory

In 1974, sociologist Elihu Katz in "Individuals' Use of Mass Communication" regarded audiences as individuals with specific needs, constructed the model.Motivational

psychology suggests that individuals' behaviors are prompted by motivation. The Uses and Gratifications theory also identifies need motivation as a crucial factor in explaining the behavior of users engaging with technology (Dai & Liu, 2015) [6]. To study users' adoption and use behavior, this study selected three demand motivation dimensions from Papacharissi & Rubin (2000) - entertainment motivation, interpersonal maintenance, and self-expression - as independent variables (Papacharissi & Rubin, 2000) [7].

3 Research Model and Hypothesis

Combining the two theoretical models, the research framework for user adoption and usage behavior in this study is determined as in Figure 1.

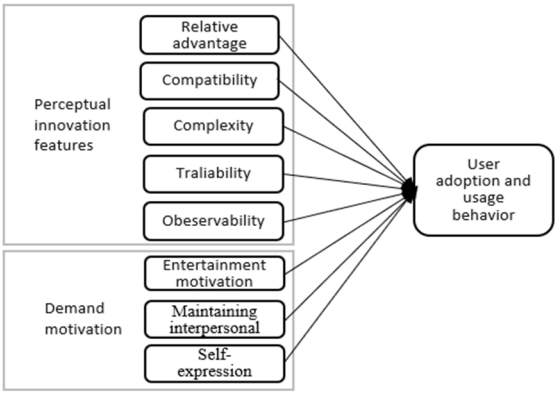

Fig. 1. User adoption and usage behavior research framework

The following hypotheses are proposed:

H1: Relative advantage is a significant predictor of user adoption and usage behavior.

H2: Compatibility is a significant predictor of user adoption and usage behavior.

H3: Complexity is a significant predictor of user adoption and usage behavior.

H4: Trialability is a significant predictor of user adoption and usage behavior.

H5: Observability is a significant predictor of user adoption and usage behavior.

H6: Entertainment motivation significantly predicts user adoption and usage behavior.

H7: Maintaining interpersonal significantly predicts adoption and usage behavior.

H8: Self-expression is a significant predictor of adoption and usage behavior.

4 Data acquisition and analysis methods

4.1 Questionnaire Design

The specific measurement items are presented in Table 4.

4.2 Data collection

This study conducted a survey using questionnaires to collect data. The sample was required to meet the following criteria: respondents must be users of Douyin and aged 60 years old or above. The researchers sent out 400 questionnaires and received 352 responses.

4.3 Measures

The questionnaire used a Likert 5-point scale, from 1 (strongly disagree) to 5 (strongly agree).

4.4 Sample size

According to the Beijing Municipal Report on the Development of Aging (2021), the resident population of the city aged 60 and above was 4.416 million by the end of 2021(CPRI,2021). Because of the large population size, the sample size was estimated in this study using the best-fit Slovin formula (n = N/(1 + Ne2)， n = sample size, N = population size, and e = marginal error of the researcher's decision); we considered a 5% error). Given this, a sample size of 400 is recommended.

5 Data analysis and results

5.1 Sample and data recovery

In this paper, elderly people who use Douyin as research objects were designed with five-level Richter scale, and 400 questionnaires were sent out and 376 questionnaires were collected by means of online and offline questionnaire survey. Among them, 352 were valid, with an effective rate of 93.61%. Among them, female samples accounted for 50.28%, male samples accounted for 49.72%, aged 65 ~69 years old, accounting for 49.43%. This study is consistent with the statistics of the Beijing Municipal Report on the Development of Aging (2021). (As shown in Table 1)

Table 1. Descriptive analysis (Frequency)

Items	Categories	N(352)	Percent **(%)**
Gender	Female	177	50.284
	Male	175	49.716
Age	60-64	109	30.966
	65-69	174	49.432
	70-74	51	14.489
	More than 75	18	5.114
Academic back-ground	Junior high school and below	151	42.898
	High school and technical secondary school	81	23.011
	College and undergraduate	93	26.42
	Master’s degree or above	27	7.67

Items	Categories	N(352)	Percent **(%)**
Occupational or pre-retirement occupation	Public institution	72	20.455
	Teachers	59	16.761
	Medical workers	58	16.477
	Freelance self-employment	85	23.579
	others	74	21.023
Service life	Less than a year	24	6.8
	1-2 years	110	31.3
	2-3 years	111	31.5
	More than 3 years	107	30.4
Daily use time	Less than 1 hour	120	34.1
	1-2 hours	180	51.1
	3-4 hours	32	9.1
	More than 4 hours	20	5.7

5.2 Questionnaire reliability and validity test

This study investigates the causal relationship between perceived innovation characteristics, demand motivation, and user adoption and usage behavior. The perceived innovation characteristics were assessed on five dimensions, namely relative advantage, compatibility, complexity, trialability, and observability. Demand motivation was measured on three dimensions, namely entertainment, social connection, and self-expression. The data were collected via a questionnaire. To analyze the reliability of the sample data obtained from the questionnaire, the reliability and validity tests were carried out by SPSS22.0 software. Cronbach'sa coefficients of each dimension are above 0.7, indicating internal consistency. The Bartlett sphericity test statistic was 0.898($p < 0.001$), so there is a strong correlation between the variables, so it is also suitable for factor analysis. The mean extraction variance (AVE) of all the variables involved is greater than 0.5, and the convergence validity of this scale is good. The square root of AVE is greater than the correlation coefficient, so the differential validity of this scale is good. (As shown in Table 2)

Table 2. Summary table of reliability, validity test and factor analysis

variable	coding	item	source
User adoption and usage behavior (AU)	AU1	I will continue to follow the Jitterbug numbers I currently like.	Zhou,2018[8]
	AU2	I will recommend favorite Jitterbug numbers to my friends.	
	AU3	I will share my friends if I see a Jitterbug video I like.	
$\alpha = 0.823$; CR = 0.845; AVE = 0.751			
Relative advantages (A)	A 1	Douyin is faster to use.	Xu,2015[9]
	A 2	Douyin is more complete than previous social media apps.	
	A 3	Douyin is richer and more interesting than the previous video software.	
$\alpha = 0.754$; CR = 0.835; AVE = 0.587			
	B 1	Using Douyin is accepted by my family and society.	

Compatibility(B)	B 2	Using Douyin fits my lifestyle.	
	B 3	Personalized recommendations match my interests.	
α = 0.656; CR = 0.703; AVE = 0.745			
Complexity (C)	C 1	Douyin is easy to register.	
	C 2	Douyin 's interface is clear and easy to understand.	
	C 3	Easy to operate using Douyin to brush videos and upload videos.	
α = 0.865: CR = 0908: AVE = 0.7121			
Trialability (D)	D 1	Feel free to uninstall.	
	D 2	There are several different versions to choose from.	
	D 3	The way I use it fits my usage habits.	
α = 0.642; CR = 0.394 AVE = 0.680			
Observability (E)	E1	Often I see others using and reposting Douyin.	Papacharissi&Rubin,2000[7]
	E2	Often see others liking and commenting on my videos.	
	E3	Often people are forwarding interesting Douyin videos to me.	
α = 0.742; CR = 0.794 AVE = 0.650			
Entertainment motivation（F）	F1	Douyin allows me to escape from reality and reduce my pain.	
	F2	Douyin can kill the boring time.	
	F3	Douyin can make me feel relaxed and happy.	
α = 0.709; CR = 0.883; AVE = 0.650			
Maintaining interpersonal（G）	G1	Douyin gives me something to talk about with my relatives and friends.	
	G2	Douyin allows me to see what my relatives and friends are up to.	
	G3	Douyin allows me to see my relatives and friends giving me likes and comments.	
α = 0.789; CR = 0.623; AVE = 0.630			
Self-expression(H)	H1	I can record daily videos with Douyin.	
	H2	I can use Douyin to express my emotions.	
	H3	I can use Douyin to comment to others.	
α = 0.689; CR = 0.862; AVE = 0.657			

5.3 Model test

Confirmatory factor analysis is a process to test whether the theoretical model is consistent with the empirical data, that is, the degree of internal adaptation between the model and the data. The authenticity and applicability of the theoretical model can be seen through verification. In this paper, with the help of AMOS21.0 and SPSS22.0 software, confirmatory factor analysis is carried out by structural equation model. In this paper, the fit of the model was tested and judged by Chi-square free ratio, mean square and square root of progressive residuals (RMSEA), good fit index (GFI) and

value-added fit index (NFI, CFI). Combined with the index values in the above charts, all indicators are in line with the standard, and the model is reasonably fit (see Table 3).

Table 3. Fit Indices for Structural Model

Index	Threshold	Value	Conclusion
CMIN/DF	1-3 is excellent, 3-5 is good	1.641	fit
RMSEA	≤ 0.05 is excellent, ≤ 0.08 is good	0.038	fit
IFI	≥ 0.9 is excellent, > 0.8 is good	0.945	fit
GFI	≥ 0.9 is excellent, > 0.8 is good	0.800	fit
CFI	≥ 0.9 is excellent, > 0.8 is good	0.943	fit

Table 4. Hypothesis test result（*p<0.05 **p<0.01）

			Unstandardized coefficient Beta	t	p	Test result
Relative advantages	<---	User adoption and usage behavior	.563	4.106	**	support
Compatibility	<---	User adoption and usage behavior	.040	5.776	**	support
Complexity	<---	User adoption and usage behavior	.187	3.509	*	support
Trialability	<---	User adoption and usage behavior	.116	1.750	.063	unsupport
Observability	<---	User adoption and usage behavior	.116	1.750	.063	unsupport
Entertainment motivation	<---	User adoption and usage behavior	.274	3.920	**	support
Maintaining interpersonal	<---	User adoption and usage behavior	.399	2.025	.017	unsupport
Self-expression	<---	User adoption and usage behavior	.179	3.389	**	support

6 Conclusion

This study concludes that several factors strongly influence the adoption and use behaviors of older adults on digital platforms such as Douyin. Among these factors, relative advantage, compatibility, complexity, entertainment, and self-expression are significant, whereas trialability, observability, and interpersonal maintenance are insignificant. Therefore, it is imperative for the platform to accurately profile its users by considering their preferences, habits, lifestyle, occupation, and other relevant factors. The platform can then deliver targeted content that corresponds to each user's interests and needs, ultimately increasing user engagement and satisfaction. Furthermore, the platform must consistently enhance its user interface and experience to minimize

complexity and maximize usability. By providing a seamless and intuitive user experience, the platform can further encourage adoption and use behaviors among older adults. These findings carry significant implications for the design and development of digital platforms, especially those that target older adult users.

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