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An Empirical analysis of Customer intention to use Smart Cards

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ABSTRACT:

The present research aims to understand the customer intention to use smart cards in the Indian context. The present study is based on 476 respondents which have been collected using convenient sampling. Exploratory factor analysis, confirmatory factor analysis, and multiple regression analysis have been applied to examine dimensions' impact on customer intention. The results of multiple regression analysis validated that customer intention towards smart cards is significantly determined by trustworthiness, intention to use, value for money, social influence, ease of use, and government initiatives.

KEYWORDS: customer intention; value for money; government initiatives; confirmatory factor analysis; multiple regression analysis; smart cards.

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INTRODUCTION

As the years passed, we found several changes in the form of money ranging from coins to paper and now to any form [1-4]. Developing at two-fold digit rates since the mid-1990s, there has been a boom in the market place since 2003 [5-7]. Nowadays everything is changed with emerging technology and similarly money has turned out to be electric money which can be used through smart cards [8-13]. Smart cards are an integrated payment system which will help a customer to make and receive payment without having any physical card by integrating a mobile application with the bank's database [14-18].Today, notwithstanding money, electronic cash cards, credit cards, smart cards, debit cards, online fund transfers, and even countertrade has empowered clients to purchase as well as utilize the items they need [19-22]. Payment cards have been around for quite a while now and with them, the comfort of stashing plastic cards has been found and delighted [23-26]. Presently, the transaction cards are being replaced by smart cards in the next generation [27-29]. Despite the never-ending benefits of using the smart cards the intentions of users are not positive especially in the rural areas in India [30-31].

Research Gap

Previously many studies have focused on the economic aspect of smart cards and various incentives a consumer gets by using a smart card [32, 10]. In addition to above, social influence on users for using the smart cards has been focused much by the researchers [33, 9, 25].However, as the concept of the smart card is new for Indian customers, the social influence and economic benefits only cannot properly address the problem of non-acceptance. Moreover to explain why people use innovative and modern technological system, researchers in user acceptance research stream have pinned various established theories of consumer behaviour, such as the Theory of Reasoned Action (TRA), the Social Cognitive Theory (SCT), Theory of Planned Behavior (TPB), and the Innovation Diffusion Theory (IDT). Based on these theories, various model like the technology acceptance model (TAM) was developed. Each model has its own independent and dependent factors for user acceptance although there are many overlaps in all the existing models [1, 34,35,32,36,37,6]. Thus this study derives the various latent contracts from different behavioural theories to explain the problem more extensively and in more depth. As a result, this study attempts to cover the gap of knowledge in existing and the previous literature. Henceforth, this study aims to explore the antecedents affecting the intention of the users to use smart cards. The objective of this study are twofold, as it addresses specifically the question of why people use a system in a particular context, because it will lead to insights as to what factors in the system that causes people to choose it over other available options and secondly the impact of those factors on customer intention to use smart cards.

Organization of the Study

The study is organized into various sections. The very first part includes an introduction, importance of the smart cards, theoretical background and hypothesis, various dimensions of smart cards, research gap, and objective of the research. The hypothesis is also established and explained. Further, in the methodology section the research design is described including data collection, a demographic profile of the respondents, and data analysis. The results have been discussed in the last section followed by discussions, implication, recommendations, and limitations of the research.

CONCEPTUAL FRAMEWORK AND HYPOTHESIS FORMULATION

As far as the review of the previous studies was concerned, the various variables having their impact upon customers' intention dominantly are trustworthiness, intention to use, value for money, social influence, ease of use, and government initiatives. The literature discussed below explains the classification of the variables that have an impact on users' intention in the context of smart cards.

Value for Money

Sudies depicted the impact of the value of money on consumer satisfaction with regard to online purchases [38]. Additionally, smart cards also help to make information clear, interactive between the parties, simplify the purchase, and sale process [1, 39-41]. These also help the consumers to make a purchase decision at a given point of time in a better way [5, 34,36,6]. Previous studies explained that smart cards affect consumer buying behavior [8, 42-44]. These studies also evidenced that the smart cards increase the spending of consumers with high self-control [23, 32, 29, 45]. It is also suggested that this effect can be decreased by increasing the credit availability on credit card [30, 2,46,31,47]. Use of credit card provides the benefit of spending now and repaying later [14,37,24,12]. This can prove beneficial in case of unplanned expenditure and emergencies [19, 28, 25].

Social Influence

Earlier it was presumed that smart cards are being used by high-income group only but with the extension of this facility, these are not only used by urban customers but also by rural customers [27, 20]. With the development of banking and commercial sector fixed income groups have also started the use of the plastic and electronic money [33, 48, 13]. Many studies have evidenced a positive impact on the lives of people from every sphere of life. These are used as an easier way of payment in the modern era [65, 36, 9, 42, 41]. Furthermore, the competitive cost of credit card leads to overconsumption because they distort competition within the credit industry [23, 34, 37, 49]. Plastic money means lesser use of cash, instead use of virtual money for making payments [14, 32, 50].

Ease of Use

In any developed economy usability of a medium of exchange is dependent upon the development of e-commerce [1, 9, 40]. By clarifying usage goal from the bank clients' viewpoint the findings of this examination will not just assist business saves money with developing better user-accepted smart card systems, yet additionally give bits of knowledge to the potential customers the newly emerging context of smart cards [5, 48]. More the benefits a bank offer to customers more is the uses of cards [27]. Previous studies evidenced that plastic money helps to access and manage accounts more easily through debit card, credit card and prepaid card [19, 25]. Using bank cards instead of cash helps in removing the hassle and risk of carrying big bundles of cash everywhere [8, 6, 11].With plastic cards in one's pockets, any transaction, however big or small, can be made and one is free from the tension of keeping safe the currency notes [30, 42, 17, 21]. Risk of theft or accidental loss of money can be eliminated with the use of plastic money [23, 37, 16, 43]. Transactions made with cash alternatives can be made without any prior planning of securing the exact amount of currency notes and carrying them over to the payee [65, 24]. People can shop, pay bills, and transfer funds sitting in the comfort of their homes [33, 45, 3]. It has become easy for travelers as they don't have to carry cash anymore [34, 28, 4]. Increase in the number of Point of sale (POS) and ATMs have helped popularize these alternatives to cash [36, 15, 51, 41].

Trustworthiness

The studies have shown that with the increase in the loyalty of smart card technology there is favorable response towards the use of smart cards [39, 18]. Loyal and satisfied customers promote these cards because of their attributes because a motivated customer believes more on the recommendation of further customers because of his quality belief [14, 20, 52]. Therefore, more the values a customer receives more he is motivated to remain loyal and promote the cards and thereby resulting in positive consumer response [19, 28, 40]. Thus, it is suggested that loyalty promotes positive word of mouth and increase the uses of smart cards [27, 39, 13]. Every transaction made with credit or debit cards is recorded which provides a clear link of the source of payments and receivers [1, 37, 17, 44]. This proves immensely beneficial in order to establish the source of money and catch any fraudulent and unaccounted move of money in the economy [30, 32, 24, 22].

Government Initiatives

The present central government has a number of ambitious programmes and flagship schemes to take pride in. Amongst the most promoted is the 'Digital India' dream of Prime Minister Narendra Modi, which gained momentum after demonetization on November 8, 2016 [53]. In order to provide

social security to India's unorganised sector's workers, the government is planning to issue smart cards for various advantages to the service sector [8, 37, 52]. The card, which will be called the Unorganised Workers' Identification Number or UWIN card, will be issued by district collectors under the Unorganised Workers Social Security Act to enable different ministries to provide services to such workers on a single card [5, 34, 48, 26, 43, 4]. There is a huge potential for the use of plastic money in India. Apart from providing enhanced convenience to the customers, plastic money can ensure transaction secrecy and integrity to them [65, 36, 15]. With demonetization, as the interest rates can go down, the use of plastic money can get further encouraged [27, 53, 25, 7]. Also, like the use of credit cards and other such options, your credit rating, and CIBIL score will improve, leading to better chances of availing loans [14, 11, 51]. The banking service sector can benefit a lot from this move [54, 18, 47]. With quick payment method, plastic money can ensure higher customer retention for banks with an enhanced level of customer satisfaction [23, 48, 45, 21]. The government can also plug leakages of government funds as plastic money will ensure electronic payment [65, 24, 17]. If the government starts to use plastic money, it will enable effective resource allocation with fewer chances of corruption [34, 39, 44]. Also, there will be no forgery headaches with plastic money having a lifespan more than four to five times of paper money [8, 33, 52, 17].

Intention to Use

Consumers have secure, convenient, and reliable means of payment with the help of the smart cards [14, 54, 49, 40]. Studies documented that the payment through the smart card is easier than paying with cash, especially while traveling [7, 2, 43, 41]. Likewise, smart cards can be used for hotel bookings and advance online airline payment, where money exchanges are not possible [5, 2, 3]. Studies have proved that use of plastic money has increased business of retail, the distribution also provides cost benefits and suggested many measures to avoid frauds [30, 48]. There are many shreds of evidence which prove that these cards are in wider use for making purchases as well as cash withdrawals [8, 33, 11, 49, 29]. The use of plastic cards has bought the world towards a cashless society [1, 10, 49, 13]. Making purchases using credit or debit cards is time and cost saving as one does not have to travel all the way to the seller to make payments providing card details over the internet suffices [19, 39, 26, 22].

Hypotheses Formulation

Following are the hypothesis:-s

$H0_1$ - There is no impact of 'value for money' dimension on customers' intention to use smart cards.

$H0_2$ - There is no impact of 'social influence' dimension on customers' intention to use smart cards.

$H0_3$ - There is no impact of 'ease of use' dimension on customers' intention to use smart cards.

$H0_4$ - There is no impact of 'trustworthiness' dimension on customers' intention to use smart cards.

$H0_5$ - There is no impact of 'government initiatives' dimension on customers' intention to use smart cards.

METHODOLOGY

In order to examine the customer intention towards smart cards item generation, refinement, and validity process was used. For the generation of the items, an extensive literature review of previous studies was carried out. The scale was modified as the requirement of the current objective. The comments of the experts were invited and researchers were also consulted for making the construct more effective and useful. The final scale was tested for reliability and validity of the scale. A five-point Likert scale ranging from strongly agrees to strongly disagree has been used to collect the information from respondents [71]. For dimension reduction, exploratory factor analysis was used and finally, confirmatory factor analysis was applied to verify the factor structure and their loadings [55-58].

Demographic Profile

The demographic profile consists of 48.32 per cent male and 51.68 per cent female participated in the survey. Moreover, 26.26 per cent of the respondents belonged to the age group of 18-27, followed by 25.63 per cent in the age group of 28-37; 25.24 per cent in the age group of 38-47; and 22.69 per cent were falling in the age group of 48-57. In the case of marital status, 72.69 per cent were married and 27.31 per cent respondents were unmarried. As far as the education of the respondents' is concerned 18.49 per cent respondents belonged to matriculation; followed by 25.63 per cent were belong to higher secondary; 32.77 per cent belonged to graduation and 23.11 per cent belonged to the respondents who have done post graduation.

Factor Analysis

Exploratory factor analysis was conducted by using principal component analysis in order to identify the set of underlying factors and constructs having an eigen value less than unit were finally ignored. In table 1 all the extracted variables along with their communalities are shown and the values are more than the threshold level of 0.50 [35, 55, 59].

Table 1. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.769
Bartlett's Test of Sphericity Approx. Chi-Square	13674.300
Cronbach's Alpha (Sample Size=476)	0.760
Number of Items	23
Df	253
Sig.	0.000

Source: Compiled from SPSS 20 output

Bartlett's test of sphericity (13674.300) and Kaiser-Meyer-Olkin measure of sampling adequacy (0.769) has been shown in table 1. The Cronbach's alpha comes out to be 0.760 which is considered satisfactory for factor analysis [55, 57, 59]. Cronbach's alpha of an individual dimension is also above the satisfactory level (0.7). So, all six dimensions were considered reliable [60, 58].

Table 2. Rotated Component Matrix

Items	**Component**					
	1	**2**	**3**	**4**	**5**	**6**
V8	.964					
V10	.956					
V9	.954					
V11	.948					
V14	.850					
V7		.976				
V23		.974				
V5		.931				
V6		.926				
V18			.951			
V19			.944			
V21			.931			
V20			.925			
V3				.957		
V2				.950		
V4				.897		
V1				.896		
V15					.924	
V17					.904	
V16					.866	
V22						.927
V12						.908
V13						.816
Percentage of Variance Explained					**86.655%**	

Source: Compiled from SPSS 20 output

After applying the varimax rotation method, six latent factors were found to be significant having eigenvalue more than one and accounted for 86.655 per cent of the total variance were retained for the further analysis. Table 2 represents rotated component matrix which shows that six factors were extracted having factor loading value more than 0.6. The factor with less than three variables is generally weak and unstable [60, 56, 59]. In addition, the factor loading of the variables must 0.6 in order to determine which items will group into which factors [61, 62, 58]. If the value is 0.6, it depends on the highest factor loading allocate by each of them. As per the standards, the value needs to be greater than 0.6. [57, 63, 3].Thus, it can be concluded that data is suitable for further analysis [60, 56].

Table 3. Factor Naming

Factor Name	Eigen Value	Dimension Reliability	Item loading	Items
Factor 1 **Intention to use** 19.064	4.624	0.964	.964	I use smart cards because it is an eco-friendly initiative.
			.956	I prefer to use smart cards to avoid paper wastage.
			.954	The smart card is the most convenient way to pay bills.
			.948	Smart cards are compatible with all modes of payments.
			.850	I usually get payback when I shop by using smart cards.
Factor 2 **Value for money** 15.997	3.990	0.962	.976	It is easy to carry and kept money through smart cards.
			.974	While purchasing luxury goods I prefer to pay for smart cards.
			.931	Due to counterfeit/duplicity of paper currency, I am shifting to smart cards.
			.926	Smart cards are need of the hour in a highly competitive global environment.
Factor 3 **Social Influence** 15.410	3.444	0.937	.951	I usually use smart cards which are promoted or mostly advertised.
			.944	My family friends influence me to use smart cards.
			.931	Social status motivates me to use smart cards.
			.925	Smart card transactions will help to crack black money circulation.
Factor 4 Ease of Use 15.003	3.168	0.918	.957	I usually use smart cards because it will be the future of the global economy.
			.950	Smart cards are compatible with the modern living style.
			.897	Nowadays Smart cards are an affordable option for everyone.
			.896	I usually prefer to pay bills through smart cards.
Factor 5 **Trustworthiness** 10.905	2.413	0.884	.924	I always consider smart cards as a reliable and secure way of shopping/payments.
			.904	By using smart cards I can get a proper record of all my past transactions.
			.866	When I use smart cards I consider myself independent.
Factor 6 **Government Initiatives** 10.276	2.292	0.861	.927	The government should provide some tax benefits to those who are using smart cards for online payment mode.
			.908	The government should implement some policies to use of smart cards.
			.816	The government should provide some discount and incentives to card users.

Source: Compiled from SPSS 20 output

Confirmatory Factor Analysis

After finding out the adequate outcomes of EFA, the CFA has been applied to test the validity of the underlying constructs. Structural model depicts that all the factors have an influence on customers' intention to use smart cards.

In the present study, Table 4 represented that *p*-value=0.000; goodness of fit index = 0.903, adjusted goodness of fit index = 0.901, Tucker-Lewis index = 0.970, normal fit index = 0.961, comparative fit

index = 0.975, and Root mean square error of approximation = 0.049. All presented values were accepted to the threshold level of fit indices [60, 64, 65, 66]. To analyse the constructs' validity, the convergent and discriminant validity was also measured.

Table 4: Model fit Indices

Indices	Ideal Value	Recommended By	Model fit Indices
***P*-Value**	0.00	Hair *et al.*, 2015	0.000
GFI	>0.9	Kline, 2011	0.903
AGFI	>0.8	Kline, 2011	0.901
CFI	>0.9	Hu and Bentler, 1999	0.975
NFI	>0.9	Hu and Bentler, 1999	0.961
IFI	>0.9	Fornell and Larcker, 1981	0.976
TLI	>0.9	Fornell and Larcker, 1981	0.970
RMSEA	<0.8	Bollen, 1989	0.049

Source: Compiled from Amos output

Table 5: Composite Reliability and Average Variance Extracted

Construct items	Cronbach's alpha	Composite Reliability	Maximum Shared Variance	Average Shared Variance	Average Variance Extracted
Intention to use	0.964	0.889	0.013	0.006	0.728
Value for money	0.962	0.965	0.008	0.003	0.847
Social influence	0.937	0.967	0.013	0.007	0.879
Ease of use	0.918	0.949	0.005	0.002	0.823
Trustworthiness	0.884	0.945	0.011	0.003	0.812
Government Initiatives	0.861	0.871	0.003	0.002	0.696

Source: AMOS version 20 output

The discriminant validity was evaluated by comparing the average variance extracted for each construct with squared correlations between constructs. Table 4 reported that square root of average variance extracted for each construct was greater than their squared correlations which establish the adequate discriminant validity [35, 55, 61, 65, 62, 63, 67]. The measurement model was found to be valid in terms of discriminant validity as both MSV and ASV of individual constructs were found to be lower than their respective average shared variance (AVE) estimates [60, 68].

Table 6: Discriminant Validity

Dimensions	Trust-worthiness	Intention to use	Value for money	Social Influence	Ease of Use	Govt. Initiatives
Trustworthiness	**0.853**					
Intention to use	-0.085	**0.920**				
Value for money	0.115	-0.087	**0.938**			
Social Influence	0.073	-0.006	0.050	**0.907**		
Ease of Use	0.042	-0.015	0.104	0.007	**0.901**	
Govt. Initiatives	0.041	-0.019	0.030	0.053	0.052	**0.834**

Source: Gakingston MS-Excel validity master output

Multicollinearity

Before conducting the multiple regression analysis, the problem of multicollinearity has been tested by the method of measuring the variance of inflation factor [69]. VIF indicates the degree of association between the independent and dependent variables and is the most commonly used and recommended measure of multi co-linearity. The suggested threshold limit of VIF is less than or equal to 10 (i.e. tolerance> 0.1) [55]. In the current study, VIF has been checked for all the constructs predicting the intention to use and is presented in Table 8. The VIF for all factors came out to be far less than the threshold limit of 10 points, thus, this has provided enough evidence against the problem of multicollinearity. Therefore, the variables are fit for conducting regression analysis.

Table 7: Results for Variance of Inflation Factor (VIF)

Construct	VIF
Trustworthiness	3
Intention to use	5
Value for money	2
Social Influence	2
Ease of Use	1
Govt. Initiatives	4

Source: SPSS Version 20 output

Multiple regression analysis

In order to determine the influence of the extracted variables on the intention to use smart cards, multiple regression analysis has been used. The summary of results is presented in table 7. The coefficient of determination (R^2) accounted for 0.838 signifying that 83.8 per cent of variance is explained by independent variables, which is quite an adequate variance in determining the intention of the customers to use smart cards [69]. The Adjusted R^2 comes out to be 0.836; R=0.915; F change=485.58; significant at 0.000; and value of Durbin Watson=1.928, all these values implies that overall model is fit and a significant relationship exists between the dependent variable and independent variables from which some important inferences can be drawn [70, 62, 66, 69].

Table 8: Model Summary of Multiple Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.915	.838	.836	.24724	.838	485.508	5	470	.000	1.928

ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	148.386	5	29.677	485.508	.000
Residual	28.729	470	.061		
Total	177.116	475			

Source: Compiled from SPSS output

The results of multiple regression analysis depict that null hypotheses for all dimensions were rejected at 5 per cent level of significance which described that all dimensions have a significant impact on customer intention to use smart cards [70, 62, 68].

Table 9: Results of Multiple Regression Analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.
		Beta	Std. Error	Beta		
	(Constant)	3.733	.011		329.435	.000*
	Value for Money	.063	.011	.103	5.536	.000*
	Social Influence	.036	.011	.059	3.163	.002**
	Ease of Use	.035	.011	.057	3.073	.002**
	Trustworthiness	.552	.011	.904	48.681	.000*
	Government Initiatives	.031	.011	.051	2.756	.006***

Independent Variable: Government Initiatives, Trustworthiness, Ease of Use, Social Influence, Value for Money
Dependent Variable: Intention to Use
Note: Significant at *p< .00, **p< .002, ***p< .006 level
Source: Compiled from SPSS output

Results and Discussions

The results of the regression analysis have been presented in table 9 and reveal that out of all the constructs, the construct of trustworthiness has the highest positive influence (β =.552, *p*-value< 0.00) on the intentions of the users to use smart cards. This finding of the study is similar to the findings of other studies [50]. This reflects that the respondents tend to use only those products in which they have faith. Also, the technology of smart cards is new to the market and most of the respondents have not opted to use this technology because of lack of trust. Thus, it makes quite a sense that, respondents being rational in nature only incline towards those technologies in which they have ample amount of faith and as a result, the construct of trustworthiness has come out to be the most significant construct. After trustworthiness, the second most significant factor is value for money with (β = 0.064 and *p*-value<0.00) and the results are in line with the studies [2, 20, 29]. The plausible explanation behind this is the role of rationality in the consumers. The consumer is only intent to use a particular technology if it delivers the ample amount of benefits to consumers as compared to efforts made to use that technology. The construct of social influence is less significant than value for money with (β=.036, *p*-value>0.002). It reflects that social influence interacts through the construct of value for money as users came into the influence of society only after they perceive that the present technology provides enough value for the money invested. However, ease of use construct has been taken from the technology acceptance model. This construct is the second least significant construct and the results are in contrast to the studies [42, 16]. As the Indian market is one of the fastest growing emerging economies and the highest youth population over the world where the majority of the population are a young adult and educated. Consequently, ease of use is a less significant factor that explains the intention of the users to use smart cards. At last, the government

initiatives is the least significant construct which influences the intention to adopt the smart cards with (β=0.031; *p*-value < 0.006). The results are also in contrast to the earlier research conducted by study [52]. This less significant influence has been justified by the fact that, most of the smart cards in the market have been introduced by the private banks and these already have invested a large chunk of money on the promotion and investment of the technology which makes the government initiatives less effective as it has been observed in this study.

CONCLUSION AND IMPLICATIONS

The present study, measures the effect of various independent factors on the intention use smart cards in India. The various factors constructs have been explored and later validated. All the explored factors were later analyzed to study their influence vis-à-vis intention to use these smart cards. All the factors were found to be significant having a noteworthy impact. Out of all the factors, trustworthiness and value of money have the highest impact followed by social influence, ease of use, and government initiatives. Consequently, the results of the research imply that the adoption of smart cards is still at the nascent phase in India; therefore, a lot of efforts are needed to mold the intentions of users towards smart cards. Moreover, this study provides great insights and also supplements the previously existing literature. In the current study, the variables that have been selected by taking into consideration the individual attributes, product-related attributes, and the societal factors as well. The results further imply that societal factors only interact and try to mold the behavior of the user if it is interacted through the trustworthiness and value for money, signifying the self-centered rationality of the users. In a nutshell, it can be said that users will only use smart cards and new banking technologies if they perceive them to be profitable.

In the case of practical and managerial implications, this study will be of great help for the policymakers to formulate new strategies which will enhance the adoption and intention to use smart cards. New strategies to protect the interest of the users should be formulated and also there is a need for the managers to provide the financial initiatives to users. Furthermore, advertisements should contain rational appeal and should address the concern of value for money. As the value for money is the second most significant construct that impacts the intentions. In addition, the next strongest predictor is the social class of the user and special attention should be given by the policymakers to attach some esteem value with the smart cards so that intention can be molded in a positive manner. Advertisements should be made in such a way that they reflect the esteem values relating to the products. As a result, the use of smart cards is beneficial for both the consumers and the service providers. Hence, it is very important to influence intentions in a positive way.

Limitations of the study

Firstly, the study specifically focused on the factors of intention to use smart cards within the business to consumer (B2C) markets only. Secondly, the data for this study were collected within the Indian consumer environment. Therefore, the generalization of the findings to other cultures can be done carefully. Finally, using convenience sampling techniques may affect the findings of the study.

Future research directions

The findings and limitations uncover a lot of potential avenues for future research. This framework can be examined in a wider context to verify its application by taking more diverse sample composition that shares large commonalities in terms of consumer values. Furthermore, it suggested that the model can be further examined within other areas of technology usage also.

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