

An Interpretive Structural Modelling Approach for Modelling the Factors Affecting Consumer Online Buying Behavior

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Abstract

E-commerce industry is one the fastest growing sectors worldwide. It is not confined to any specific category or demography. Online shopping done at the click of a button is so convenient that consumers can easily navigate through large number of brands competing in the market and make the best possible choice. The present paper aims to explore the factors that endeavor consumers to purchase online. Subsequently, an interpretive structural modelling approach is employed to detect the interrelationship among these factors. Finally, an ISM model is formed that depicts the interrelationship among the factors that impact online buying behavior of consumers. Further MICMAC analysis is performed to categorize the factors on the basis of their driving and dependence power. Factors identified include price, product details, perceived risk, perceived benefits, attitude, trust, e-loyalty, and subjective norms. An ISM model depicting four levels of hierarchy is developed. MICMAC analysis reveals that price and perceived risk are dependent factors, whereas, perceived benefit, attitude, and trust are linking factors. Last, product details, e-loyalty, and subjective norms are categorized as independent factors.

Keywords : Consumer behavior, ISM approach, MICMAC analysis, online buying

I. INTRODUCTION

There has been huge spike in e-commerce in the last few years and is expected to further increase in coming years. The rapid increase in mobile and internet users has facilitated e-commerce in both rural and urban regions [1]. With the improvement of data affordability, consumption growth, and newer financial products, the e-commerce is said to grow across e-tail, travel, consumer services, and other online services. It is expected that Indian e-commerce market will exceed USD \$ 100 billion by 2022 with financial services set to grow the fastest [2]. Originally pioneered by Michael Alderich in the United Kingdom, online shopping is steadily spreading all over the world. It saves consumers time, energy, and money of visiting a physical store. Online purchase also helps the sellers understand consumer experience via the reviews posted on websites

and social networking media. Nowadays, e-commerce website offers a wide range of products including books, grocery, clothing, footwear, furniture, electronics, and others [3]. Keeping in view the buzz of online shopping, the present paper attempts to find the factors that prompt consumers to purchase online buying. The main objective of this paper is to establish an interrelationship among these factors with the aid of interpretive structural modelling approach. The factors considered for study are price, product details, perceived risk, perceived benefit, attitude, trust, e-loyalty, and subjective norms.

II. ONLINE BUYING BEHAVIOR

Sivakumar and Gunasekaran [4] found that consumer innovativeness, perceived benefits, perceived risk, attitude, and intention were the major determinants that induced millennial consumers to purchase online. Bucko,

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Kakalejcik, and Martina [5] proposed that the major factors that influenced consumer online buying behavior were price of the product, availability, social proof, scarcity, product details, conditions, and social media. Zendeheh, Paim, and Osman [6] found that compatibility, subjective norms, and relative advantage were the most important consumer attitudes that influenced consumers for online shopping. Uzun and Poturak [7] found trust and convenience followed by product prices and quality as the most influential factors. According to Park and Kim [8], the quality of information, quality of user interface, satisfaction of e-purchase significantly induce consumer towards online purchase. Javadi, Dolatabadi, Nourbakhsh, Poursaeedi, and Asadollahi [9] found financial risks, convenient risks, return policy, subjective norms, non-delivery risks, and perceived behavior control to be independent variables, whereas attitude and online shopping behavior to be dependent variables. Financial risk, that is fear of losing money withdraws consumers from doing transactions online. Non-delivery risk is another significant variable. Limayem, Khalifa, and A. Frini [10] found attitude, subjective norms, and belief that concern consequence of online buying to be the most influential factors considered significant

by consumers while buying online. Narges, Laily, and Ali [11] conducted a study to examine the determinants of online purchase intention among students. It was found that the most pertinent factors were personalities (utilitarian and hedonic) and perceived benefits (convenience, homepage, wider selection, price, customer services, and fun). Nagra and Gopal [12] concluded that age, gender, income, family size, marital status had a positive impact on online shopping behavior of consumers. Al-Debei, Akroush, and Ashouri [13] concluded that trust and perceived benefits were the most significant indicators of online purchase behavior. Jusoh and Ling [14] found that age, occupation, income range, and hours spent in online shopping did not have any significant influence on consumer online buying attitude, whereas consumer online experience and consumer services provided by e-commerce firms had a significant attitude influence on consumer buying behavior. On the basis of literature review eight factors Price, Product details, Perceived Risk, Perceived Benefits, Attitude, Trust, e-loyalty, Subjective Norms were further considered for study, shown in Table I with meaning.

TABLE I.
FACTORS AND THEIR MEANING

Factors	Meaning
Price	For online shopping, price includes price of product, shipping price, discount, and special offers [5].
Product details	Product details for online shopping include details of product displayed and product photo [5].
Perceived Risk	Perceived risk is the amount of risk which is anticipated by consumers before actually making purchase decision [15].
Perceived Benefits	Perceived benefits for online shopping include convenience, homepage, wider selection, customer services, price, and fun [11].
Attitude	Attitudes measure the favorable and unfavorable feeling for performance of behavior [16].
Trust	Trust is somewhat related to security. Since in online shopping consumer cannot see the product as well as the person selling the products, so it is essential for companies to build trust among consumers [17].
e-Loyalty	Loyalty is defined as strong association between company and the customer. Loyalty can be defined in the same manner as store loyalty where customer comes back continuously to the same place [17].
Subjective Norms	Subjective norms trap the consumers' perception of influence on others (i.e. family, friends, media, and authoritative figure). It is an act based on the perception of what others say they should be doing [16].

III. ISM APPROACH

ISM (Interpretive structural modelling) is defined as a system which aims at providing assistance to humans by transforming unclear vague mental models to a well-defined model [18]. The model so formed transforms the complex problem or issue to a well-designed pattern. ISM is a technique in which a cluster of variables or factors which are directly or indirectly related are structured into a systematic model [19]. ISM approach was originally propounded by Warfield [20].

The steps involved in ISM are given below:

Step 1 : Identification of factors

The first step in ISM is to identify the factors which pertain to a situation or issue. In the present paper, the various factors which affect consumer online buying behavior are extracted from literature. Eight factors taken for study include price, product details, perceived risk, perceived benefits, attitude, trust, e-loyalty, and subjective norms.

Step 2 : Development of SSIM (Structural self-interaction matrix)

The next step in ISM is to do a pairwise comparison by developing a VAXO table. For this, a group of experts is consulted from industry or academia [21]. The VAXO table denotes the inter-relationship between factors (i and j) as shown in Table II where :

- ↪ V depicts that factor i influences factor j .
- ↪ A depicts that factor j influences factor i .
- ↪ X depicts that both i and j influence each other.
- ↪ O depicts that both i and j are unrelated.

Pairwise comparison of all the eight factor is done with the help of group of experts. About half of the table is left blank as the pairwise comparison of these factors is already done in other half part.

Step 3 : Development of Initial Reachability Matrix

SSIM matrix in this step is transformed into reachability matrix by converting the values of SSIM into 1s and 0s as shown in Table III.

- ↪ If (i, j) entry in SSIM is V then it becomes 1, and if (j, i) is V then it becomes 0.

- ↪ If (i, j) entry in SSIM is A then it becomes 0, and if (j, i) is A then it becomes 1.

- ↪ If (i, j) entry in SSIM is X then it becomes 1, and if (j, i) is X then also it becomes 1.

- ↪ If (i, j) entry in SSIM is O then it becomes 0, and if (j, i) is O then also it becomes 0.

The factors of SSIM in this step are numbered from 1 to 8 and assigned 0s and 1s in both directions (i, j) and (j, i) and now the entire table is filled.

Step 4 : Development of final Reachability Matrix.

After preparing the initial reachability matrix its transitivity is checked and 1* is used in place of 0s where there is error. Then a final reachability matrix is prepared as shown in Table IV. Transitivity indicates if factor 1 is related to 2 and factor 2 to 3, then it means 1 is related to 3.

Step 5 : Partitioning the final reachability matrix

In this step the partitioning of final reachability matrix is done to find the hierarchy by assessing reachability sets and antecedents sets for each factor [22]. Reachability sets include all the factors which are present in the row of the given factor, it depicts all the factors on which that particular factor is dependent. The antecedent sets include all the factors which are there in the column of that particular factor, it depicts all the factors which that particular factor drives. Intersection sets depict all the common factors of the reachability and antecedents sets. If the reachability set and intersection set are same then those factors occupy the first level and then all those factors are removed to find the next subsequent levels. Table V shows first iteration where, factor 3 (Perceived risk) is found at level 1 and it occupies the top position in the ISM model. Now factor 3 is removed from all sets to find subsequent iteration table and in the second iteration as shown in Table VI four factors, namely, perceived benefit, trust, attitude and e-loyalty are found at level 2 in the hierarchy of ISM model. After this, all these four factors are removed and in the third iteration shown in Table VII, price and subjective norms occupies the third level in the hierarchy of ISM model. Lastly, after removing price and subjective norms in iteration 4 as shown in Table VIII, product detail occupies the fourth level in the hierarchy of ISM model.

Step 6 : Development of conical matrix

A conical matrix is prepared from the final reachability matrix by clubbing together the factors of partition levels shown in Table IX.

Step 7 : Development of ISM model

An initial diagram is obtained based on the final reachability matrix including the transitive links which may be removed later for the sake of convenience. An ISM model is developed as shown in Fig. 1. based on level partitioning where perceived risk is placed at the top followed by perceived benefits, trust, attitude, and e-loyalty on the next level. Then price and subjective norms are placed in the third level of hierarchy, and finally product details are placed at the last level of hierarchy. Thus, an ISM model of factors influencing consumers' online shopping behavior is obtained where it is shown that product details lead to price awareness,

which further leads to perceived benefit which leads to formation of attitude and then trust and finally, e-loyalty which helps in formation of subjective norms. Perceived benefits, attitude, trust and e-loyalty amount to perceived risk. Further, trust and attitude are interrelated.

IV. MICMAC ANALYSIS

Matrice d' impact Croises-multiplication applique (cross - impact matrix multiplication to classification) is abbreviated as MICMAC analysis. It is a process of classifying the variables under different categories [23]. Based on driving power and dependent power factors can be classified into 4 categories :

(1) Autonomous – the factors which have weak drive power as well as weak dependence power are classified as autonomous factors.

TABLE II.
SSIM MATRIX

	Subjective Norms	E-loyalty	Trust	Attitude	Perceived Benefits	Perceived Risk	Product Details	Price
Price	O	O	O	V	X	O	O	X
Product Details	O	O	O	V	V	V	X	
Perceived Risk	O	A	A	A	A	X		
Perceived Benefits	O	A	O	V	X			
Attitude	A	A	X	X				
Trust	O	X	X					
E-loyalty	O	X						
Subjective Norms	X							

Table III.
INITIAL REACHABILITY MATRIX

	Price	Product Details	Perceived Risk	Perceived Benefit	Attitude	Trust	E-Loyalty	Subjective Norms
Price	1	0	0	1	1	0	0	0
Product Details	0	1	1	1	1	0	0	0
Perceived Risk	0	0	1	0	0	0	0	0
Perceived Benefit	1	0	1	1	1	0	0	0
Attitude	0	0	1	0	1	1	0	0
Trust	0	0	1	0	1	1	1	0
E-loyalty	0	0	1	1	1	1	1	1
Subjective Norms	0	0	0	0	1	0	0	1

TABLE IV.
FINAL REACHABILITY MATRIX

	Price	Product	Perceived	Perceived	Attitude	Trust	E-Loyalty	Subjective	Driving
		Details	Risk	Benefit				Norms	power
Price	1	0	0	1	1	1*	0	0	4
Product Details	1*	1	1	1	1	1*	0	0	6
Perceived Risk	0	0	1	0	0	0	0	0	1
Perceived Benefit	1	0	1	1	1	1*	0	0	5
Attitude	0	0	1	0	1	1	1*	0	4
Trust	0	0	1	1*	1	1	1	0	5
E-loyalty	1*	0	1	1	1	1	1	1	7
Subjective Norms	0	0	0	0	1	1*	0	1	4
Dependent Power	4	1	7	5	7	7	2	2	

TABLE V.
ITERATION 1

Factors	Reachability set	Antecedent set	Intersection set	Level
1	1456	1247	14	
2	123456	2	2	
3	3	2345678	3	I
4	13456	12467	146	
5	3567	1245678	567	
6	34567	1245678	4567	
7	1345678	567	567	
8	3567	78	8	

TABLE VI.
ITERATION 2

Factors	Reachability set	Antecedent set	Intersection set	Level
1	1456	1247	14	
2	12456	2	2	
4	1456	12467	146	
5	567	1245678	567	II
6	4567	1245678	4567	II
7	145678	567	567	
8	568	78	8	

(2) Dependent – the factors with strong dependence power but weak driving power are classified as dependent factors.

TABLE VII.
ITERATION 3

Factors	Reachability set	Antecedent set	Intersection set	Level
1	1	12	1	III
2	12	2	2	
4	1	12	1	III
7	18	0	0	
8	8	8	8	III

TABLE VIII.
ITERATION 4

Factors	Reachability set	Antecedent set	Intersection set	Level
8	2	2	2	IV

(3) Linkage – The factors with strong dependence as well as driving power are classified under linkage factors.

(4) Independent factors – the factors with weak dependence power but strong driving power are classified as independent factors.

The key objectives of MICMAC analysis in this study is to identify and analyze factors affecting online consumer buying behavior based on the driving and dependence power found out in final reachability matrix. Based on the MICMAC analysis classification, factor 1 (price) and factor 3 (perceived risk) are found as dependent variable. Further factor 4, factor 5 and factor 6

TABLE IX.
CONICAL MATRIX

	Perceived Risk	Perceived Benefits	Attitude	Trust	E-loyalty	Price	Subjective Norms	Products Details
Perceived Risk	1	0	0	0	0	0	0	0
Perceived Benefits	1	1	1	1	0	1	0	0
Attitude	1	0	1	1	1	0	0	0
Trust	1	1	1	1	1	0	0	0
E-loyalty	1	1	1	1	1	1	1	0
Price	0	1	1	1	0	1	0	0
Subjective Norms	1	1	1	1	1	0	1	0
Products Details	1	1	1	1	0	1	0	1

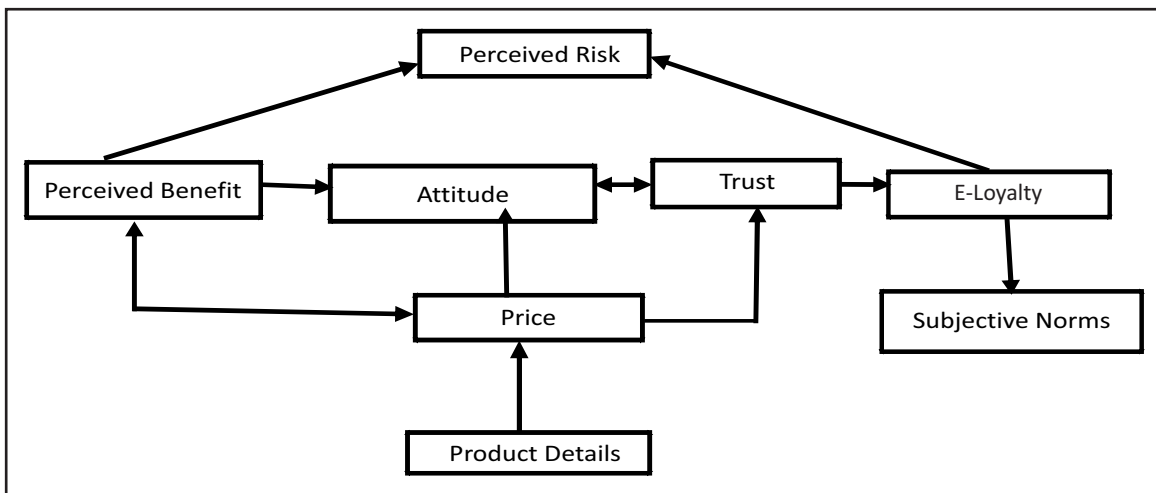


Fig. 1. ISM Model

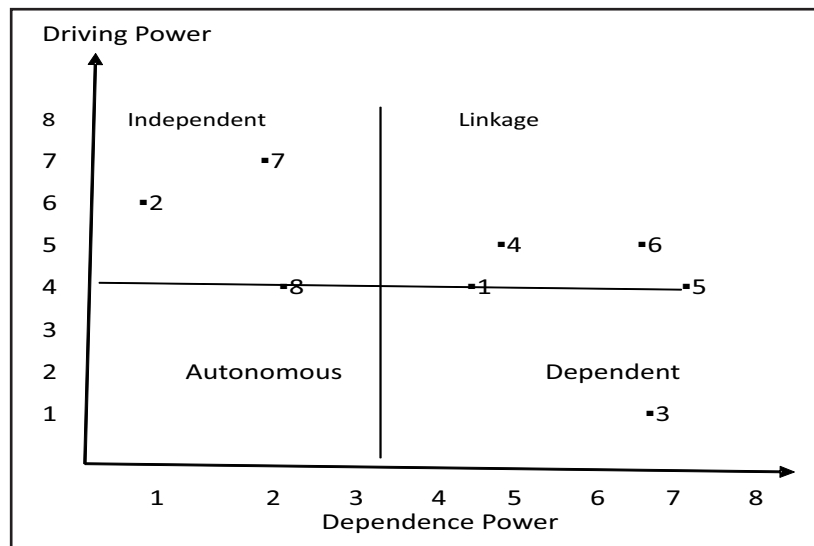


Fig. 2. MICMAC ANALYSIS

are categorized as linkage factors. Lastly factor 2 (product details), factor 7 (e-loyalty) and factor 8 (subjective norms) as independent factors as depicted in Fig.2.

V. LIMITATIONS

Some important research papers in concerned field might have been left out for literature review. Further, such ISM model could be developed for consumer offline buying behavior and for different sectors.

VI. CONCLUSION

The main objectives of this study are to identify the factors affecting online buying behavior of consumers and develop a hierarchy of those factors that would help online retailers in developing their strategies to increase their sales and profits. Based on extensive literature review, the following factors are identified (1) Price (2) Product details (3) Perceived risk (4) Perceived benefits (5) Trust (6) Attitude (7) E-loyalty and (8) subjective norms. Subsequently, an ISM model with four levels of hierarchy is developed depicting relationship among the factors influencing online shopping behavior. MICMAC analysis approach is used to categorize the factors based on their driving and dependence power. It is found out that no factor is categorized as autonomous, which means that no factor is isolated from the whole system. Two factors, price and perceived risk are classified as dependent with strong dependence power but weak driving power. Three factor, namely, perceived benefit, attitude, and trust are categorized as linkage factors having strong dependence and driving power. Further product details, e-loyalty and subjective norms are categorized as independent factors having strong driving power but weak dependence power.

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