INFORMATION TECHNOLOGY: A TOOL TO DRIVE CUSTOMER EXPERIENCE

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ABSTRACT

The purpose of this study is to audit the IT for driving customer experience. To achieve this objective an interdisciplinary approach has been followed where the relation among the key dimensions of IT management, customer experience and marketing outcomes has been analysed. For this purpose integrated ISM-fuzzy MICMAC approach has been used. Firstly ISM model representing hierarchical structure of research items has been developed then with the help of fuzzy MICMAC technique items are analysed and classified into various group on the basis of their driving and dependence power. Findings of this research could be used by firms to understand the criticalities of research items and consider them in their strategies for improving their performance in the customer journey at various touch points through enhancing customer satisfaction, word-of-mouth recommendation and loyalty intentions.

Keywords: Customer experience, IT, ISM-fuzzy MICMAC, Interdisciplinary.

INTRODUCTION

Information technology tools have increasingly penetrated organisations and organisations are strategically implementing IT tools to achieve goals and objectives of employees and organisations (Huang et al., 2015; Braojos et al., 2019). IT tools like social media (Facebook, WhatsApp, Youtube etc.), Internet, POS, embedded systems etc. are promising the superior organisational performance as well as employees performance (Kumar et al., 2016). Penetration level of IT in society is also very high. In India 813.2 million people have mobile phone (Statistia, 2019a). According to a research report, number of smartphone users are increasing very fast in India and expected to be 299.24 users by the end of year 2022 (Statistia, 2019c). In 2019, India has 241 million Facebook users (Statistia, 2019b) and by 2021, 29 percentage of total population would be active user of social media (Diwanji, 2019). India have highest no of Internet users (Diwanji, 2019). Statistics evidence the rise of digital India. This rise of digital India is creating both opportunities and challenges for the organizations. In Digital India IT tools are providing platforms for customer-to-customer interaction especially social media. IT tools also provides various media and tools for customer assessment. Researches evidence customer assessment as one of the critical component which has significant positive impact on Cx (Lemon & Verhoef, 2016). Researches evidence that customer-to-customer interaction has significant effects on customer experience (Cx) as customer experiences are more social in nature (Lemon & Verhoef, 2016; Leeflang et al., 2013). This scenario has created significant challenges as well as opportunities before the companies across the industries. (Marketing Science Institute, 2018) The marketing science institute (2018) observes one of its most important research challenges in coming years is ‘customer experience’ because of increasing complexity of customer touch points, customers belief and pressure to justify Cx invested ROI.

Citation Information: Tewari, S.K. (2022). Information technology: a tool to drive customer experience. *Academy of Marketing Studies Journal, 26*(S1), 1-14.

This research is an effort to identify the dependency relationship between the items of IT, customer experience and analyse their driving and dependence power so, companies can understand the criticalities of these items and consider them in their strategies for improving their performance in the customer journey at various touch points through enhancing customer satisfaction, word-of-mouth recommendation and loyalty intentions. To achieve these objectives Integrated ISM-fuzzy MICMAC approach has been used.

LITERATURE REVIEW

Customer Experience

According to Lemon & Verhoef (2016): "*Customer experience is a multidimensional construct focusing on a customer's cognitive, emotional, behavioural, sensorial and social response to a firm's offering during the customers' entire purchase journey."*

Customer experience encompasses the product experience, pricing experience, place (SCM) experience, promotion experience, people (human resource involved in service encounter) experience, process (delivery) experience and physical evidence experience (Grewal et al., 2009; Meyer & Schwager, 2007). The root of customer experience in marketing can be easily traced in customer buying behaviour process model, customer satisfaction and loyalty, service quality, relationship marketing, customer relationship management (CRM), customer centricity & customer focus and customer engagement (Lemon & Verhoef, 2016). Cx is a distinct construct. It is different from other customer focused constructs. Cx is related to more focused constructs like customer satisfaction, word-of-mouth, loyalty, service quality etc. (Lemon & Verhoef, 2016; Klaus & Maklan, 2013; Maklan & Klaus, 2011). Cx is a latent variable. It is measured mainly through customer satisfaction, word-of-mouth behaviour and loyalty intentions (Klaus & Maklan, 2013). Research evidences that there are some other dimensions like outcome focus, peace-of-mind, product experience and moments-of-truth which drive the Cx. Details of these constructs are as follows Table 1 Customer experience quality dimensions and attributes (Maklan & Klaus, 2011).

Table 1
CUSTOMER EXPERIENCE QUALITY DIMENSIONS AND ATTRIBUTES (MAKLAN & KLAUS, 2011)

SN	Dimensions	Attributes	Definition
1	Peace-of-mind	Expertise	Customer confidence in the expertise of good/service provider
		Process ease	Efficiency and effectiveness in the execution of purchase process
		Relationship Vs Transaction	Treatment during purchase Vs Treatment after the sales
		Convenience retention	Facilitate the customer in order them feel convenience to retain with the firm.
		Familiarity	Make the customer journey process familiar with the customers
		Independent advice	Degree of customization
2	Outcome focus	Inertia	Degree of retention ability of customer with the firm
		Result focus	Product/service Vs price/facility
		Past experience	Lack of confidence about other firms

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		Common grounding	Commonality with product/service advisor
3	Moments-of-truth	Flexibility	Flexibility of firm in handling the customer
		Pro-active	Keep the customer up to date and inform them about new options
		Risk perception	Customer perception about risk associated with firm
		Interpersonal skill	Soft skills of human resource involve with customer in customer journey
		Service recovery	The way firms deal with customer when things went wrong
4	Product experience	Freedom of choice	Flexibility to choose best option
		Cross-product comparison	Help in comparing the products of different companies
		Comparison necessity	Unless customer compare different options, they will not know which one is best for them
		Account management	Designated contact person throughout the customer purchase journey

Information Technology

In digital era we can easily observe the footprints of IT in all the business and personal activities. Whenever we go through the customer journey process we can observe the usage of IT in each stage Table 2. By going through the Table 2 we can conclude that IT has role in experience quality at each stage of customer journey. Literature evidence that mere adoption of IT is not very useful, its alignment with organisational strategies is very essential (Tewari & Misra, 2015; Tewari & Misra, 2013).

Table 2
CUSTOMER JOURNEY STAGES AND USE OF IT

SN	Customer Journey Stages	Use of IT
1	Previous Experience (prepurchase stage, purchase stage and postpurchase stage)	With the help of IT tools like social media, third party websites, company's website etc. customer can get the review comments about the product/service.
2	Prepurchase stage	At this stage IT tools help in need recognition, consideration and search for products and services
3	Purchase stage	At this stage IT tools help in choice, ordering and payment
4	Postpurchase stage	At this stage IT tools help in consumption, usage, engagement and service request
5	Future Experience (prepurchase stage, purchase stage and postpurchase stage)	At this stage IT tools are used to record the customer feedback about the entire customer journey. It may be company sponsored or by individual third party or self- claimed response by customers (YouTube videos, Facebook comments etc).

Based on above literature and discussion with experts, this research has chosen following constructs for this interdisciplinary research.

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RESEARCH METHODOLOGY

Through extensive literature review three constructs marketing outcome, customer experience and information technology management and their items has been identified.

Table 3
RESEARCH CONSTRUCTS ITEMS CODE AND LITERATURE SUPPORT

Enablers		E9	E8	E7	E6	E5	E4	E3	E2	E1
Loyalty Intentions	E1	A	A	A	A	A	A	O	A	
Customer Satisfaction	E2	A	A	A	A	A	A	V		
Word-of-Mouth Behaviour	E3	A	A	A	A	A	A			
Product Experience	E4	A	A	V	A	V				
Outcome Focus	E5	O	A	A	A					
Moments-of-Truth	E6	A	A	V						
Peace-of-Mind	E7	A	A							
Strategic Alignment	E8	V								
Adoption Level	E9									

This research identifies nine items Table 3 related to these three interdisciplinary constructs. To predict the hierarchical relationship between these items ISM technique has been used where the judgment of group of experts is used to identify the nature of relationship between the items. Structural self-interaction matrix (SSIM) has been used to collect the information from group of experts having academicians and practitioners from the field of marketing, and IT management who were involved in research and publish papers in reputed journals or provide consultancy services or working for reputed manufacturing/service firms in India. Creation of sampling frame was based on snowball technique, professional networking sites and websites of reputed organizations related to education, manufacturing and service. Further integrated ISM-fuzzy MICMAC technique has been used to analyse and group the research items on the basis of their driving and dependence power.

Data Collection

In this study seven manufacturing firms and five service providing firms from different industry including FMCG, electrical & electronics, automotive, chemical, banking and hotel and six academic institutes of repute in India were identified. Later data was collected from 24 industry experts and 18 academicians with the help of questionnaire having 36 pair of items for comparison. The association between the items were firstly checked with ‘Yes’ and ‘No’ questions then weight is assigned on the scale of 0 to 1.

Interpretive Structural Modelling (ISM)

The ISM is a philosophical approach, first proposed by J. Warfield in 1974 to analyse the complex socioeconomic system (Warfield, 1974; Warfield, 1976; Warfield, 1994). ISM deals with the complex system by analysing it through systematic iterative processes and transform the complex and poorly defined hypothetical system into a hierarchically arranged more visible model for analytical interpretation (Saxena et al. 2006).

In ISM, a group of experts decides the type of relationship exist between the elements,

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after that through a systematic process, driving and dependence power of elements are identified then a structure is extracted in the form of diagraph model. The steps involved in constructing an ISM (Singh et al., 2014; Srivastava & Sushil, 2013) are as follows.

1. Identification of Factors: By extensive literature review, brain storming sessions, Delphi method or opinion from academicians and practitioners, identify the factors/elements related to the problem.
2. Identification of Contextual Relationship: With the help of expert opinion identify the contextual relationship among each element with respect to whom pair of elements would be examined.
3. Development of structural Self-Interaction Matrix (SSIM): After resolving the factors and contextual relationship, do a pair wise comparison of the factors to create a structural self-interaction matrix.

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4. Preparation of Reachability Matrix: Prepare reachability matrix from the SSIM. Transitivity is also considered for the preparation of final reachability matrix. It states that if factor A determines factor B and factor B determines factor C then factor A will necessarily determine factor C.
5. Preparation of Canonical Matrix: Prepare the canonical matrix format by arranging the factors according to their levels with the help of reachability matrix.
6. Development of diagraph
7. Removal of transitivity from the diagraph
8. Conversion of diagraph to ISM: Replace the nodes of variables with relationship statements.
9. Model Review: Review the model to check for inconsistency. If any inconsistency (ies) found then make necessary amendments.

Structural Self-Interaction Matrix (SSIM)

With the inputs from the rigorous literature review, the items from different discipline are identified. To identify the relationship between two items, the experts were asked to identify the direction of relationship between two enablers. All the pair of factors was selected one by one and views of experts were recorded. The four symbols namely 'V', 'A', 'X' and 'O' have been used to present the directional relationship between research items (i (row) and j (column)) Table 4 using the following rules.

V: Item i determines Item j

A: Item j determines Item i

X: Item i determines Item j and Item j determines Item i

O: Item i and Item j are not related

Table 4
STRUCTURAL SELF-INTERACTION MATRIX (SSIM)

IF	Then
the (i, j) entry in the SSIM is V	the (i, j) entry in the reachability matrix becomes 1 and the (j, i) entry becomes 0
the (i, j) entry in the SSIM is A	the (i, j) entry in the reachability matrix becomes 0 and the (j, i) entry becomes 1
the (i, j) entry in the SSIM is X	the (i, j) entry in the reachability matrix becomes 1 and the (j, i) entry becomes 1
the (i, j) entry in the SSIM is O	the (i, j) entry in the reachability matrix becomes 0 and the (j, i) entry becomes 0

Initial Reachability Matrix (IRM)

Initial reachability matrix also called binary matrix is derived by substituting the V, A, X and O symbols of SSIM by 0 and 1. Substitution rules are mentioned in Table 5.

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Table 5 SUBSTITUTION RULES FOR CREATING IRM FROM SSIM									
Table 5 Level Partition Matrix	1	1	1	1	1	0	1	0	0
E7	1	1	1	0	1	0	0	0	0
E8	1	1	1	1	1	1	1	0	1
E9	1	1	1	1	0	1	1	0	0

After incorporating the transitivity the final reachability matrix is shown in Table 6.

Table 6 FINAL REACHABILITY MATRIX									
Enablers	**E1**	**E2**	**E3**	**E4**	**E5**	**E6**	**E7**	**E8**	**E9**
E1	1	0	0	0	0	0	0	0	0
E2	1	1	1	0	0	0	0	0	0
E3	0	0	1	0	0	0	0	0	0
E4	1	1	1	1	1	0	1	0	0
E5	1	1	1	0	1	0	0	0	0
E6	1	1	1	1	1	1	1	0	0
E7	1	1	1	0	1	0	1	0	0
E8	1	1	1	1	1	1	1	1	1
E9	1	1	1	1	I*	1	1	0	1
1*:Transitive dependency									

Level Partitions

Level Partition was carried out to place the factors level wise (Warfield, 1974). For level partition the reachability set and antecedent set are created with the help of final reachability matrix Table 6. The reachability set include items/factor itself and others items/factors which it may be determined by that factor, Similarly, the antecedent set consist of items itself and the other items which may help in determining it. Then the intersection set are derived for all the items which represents the common items between reachability set and antecedent set of that particular item. The items for which the intersection and reachability set are same are levelled. Once the levels are identified it is removed from the other items. Then the same process is repeated until all items are levelled Table 7. These levels help in building the digraph or directed graph and the final model.

Table 7 LEVEL PARTITION MATRIX				
Iteration 1				
Factors	**Reachability Matrix**	**Antecedent Set**	**Intersection Set**	**Level**
E1	E1	E1,E2,E4,E5,E6,E7,E8,E9	E1	I
E2	E1,E2,E3	E2,E4,E5,E6,E7,E8,E9	E2	
E3	E3	E2,E3,E4,E5,E6,E7,E8,E9	E3	I
E4	E1,E2,E3,E4,E5,E7	E4,E6,E8,E9	E4	
E5	E1,E2,E3,E5	E4,E5,E6,E7,E8,E9	E5	

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E6	E1,E2,E3,E4,E5,E6,E7	E6,E8,E9	E6	
E7	E1,E2,E3,E5,E7	E4,E6,E7,E8,E9	E7	
E8	E1,E2,E3,E4,E5,E6,E7,E8	E8	E8	
E9	E1,E2,E3,E4,E5,E6,E7,E9	E8,E9	E9	

Building the Digraph (ISM model)

The ISM hierarchy is the graphical form of the reachability matrix where items are placed in levels and arrows are used to present the directional relationship between them. Finally ISM model is created by removing all transitivity Figure 1.

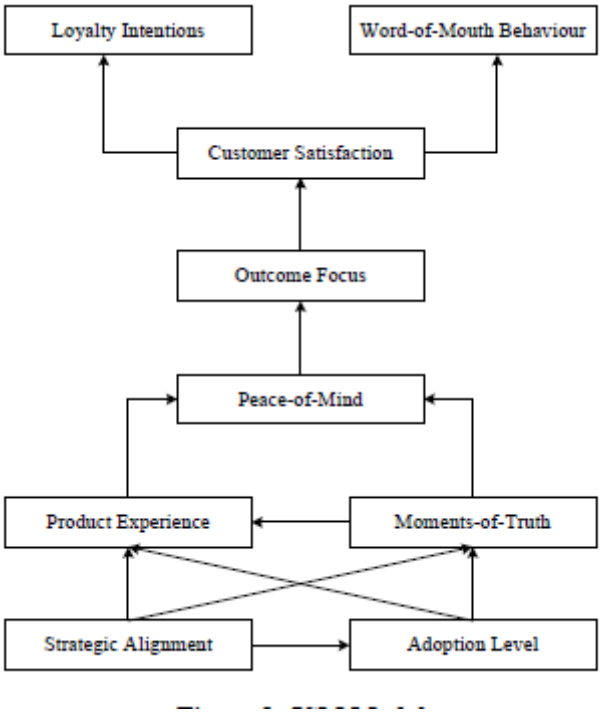

FIGURE 1
ISM MODEL

Fuzzy Matrice d'Impacts Croises-Multiplication Applique' and Classement analysis (MICMAC) (Cross-Impact Matrix Multiplication Applied to classification).

MICMAC analysis is used to analyse the driving and dependence power of the items. Direct reachability matrix facilitates the MICMAC analysis by providing driving and dependence power of the factors. But the direct reachability matrix is in binary form where relations are represented by either '0' or '1'. Where '0' represent absence of relation and '1' represent presence of relation. In this arrangement, all the relations are treated equally. But the relationships between the items are not always equal. Some relationship may be strong, some may be especially strong and some relations may be better. To resolve this issue Fuzzy MICMAC analysis is used for better placement of the items in various groups. The following are the stepwise explanation of Fuzzy MICMAC analysis (Dewangan et al., 2015; Gorane & Kant, 2013).

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Binary Direct Relationship Matrix

The binary direct relationship matrix Table 8 is obtained by converting the diagonal elements of initial reachability matrix to '0' from '1'. It represents the direct relationship between the items.

Table 8
FUZZY DIRECT REACHABILITY MATRIX

Enablers	E1	E2	E3	E4	E5	E6	E7	E8	E9
E1	0	0	0	0	0	0	0	0	0
E2	1	0	1	0	0	0	0	0	0
E3	0	0	0	0	0	0	0	0	0
E4	1	1	1	0	1	0	1	0	0
E5	1	1	1	0	0	0	0	0	0

Development of Fuzzy Direct Relationship Matrix

To shift from traditional MICMAC analysis to Fuzzy MICMAC analysis which is considered more sensitive, an additional input of possibility of interaction between research items is required. The possibility of interaction can be defined by qualitative consideration on 0-1 scale Table 9. Again the opinion of same academicians and experts as mentioned in section 3.1 are consulted to rate the pairwise relationship among items on the scale given in T able 9.

Table 9
POSSIBILITY OF NUMERICAL VALUE OF REACHABILITY

Possibility of Reachability	NO	Very Low	Low	Medium	High	Very High	Complete
Values	0	0.1	0.3	0.5	0.7	0.9	1

To obtain the fuzzy direct relationship matrix Table 10 the values for the relationship between two research items are then superimposed on the values of binary direct relationship matrix.

Enablers	E1	E2	E3	E4	E5	E6	E7	E8	E9
E1	0	0	0	0	0	0	0	0	0
E2	0.9	0	0.9	0	0	0	0	0	0
E3	0	0	0	0	0	0	0	0	0
E4	0.7	0.9	0.5	0	0.7	0	0.9	0	0
E5	0.5	0.9	0.7	0	0	0	0	0	0
E6	0.9	0.9	0.9	0.9	0.7	0	0.9	0	0
E7	1	1	1	0	0.9	0	0	0	0

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E8	0.5	0.7	0.7	0.9	0.7	0.7	0.7	0	0.9
E9	0.9	0.9	0.9	0.9	0	0.9	0.9	0	0

Fuzzy MICMAC (Cross-Impact Matrix Multiplication Applied to Classification) stabilized Matrix

Fuzzy direct relationship matrix (FDRM) is passed through a multiplicative process where FDRM is repeatedly multiplied until the hierarchies of the driving and dependence power of factors are stabilized. Multiplication process follows the principle of fuzzy composition (Max-Min Composition). It is basically a generalization of Boolean matrix multiplication. According to fuzzy set theory (FST), when two fuzzy matrices are multiplied the product matrix is also a fuzzy matrix. The multiplication follows the following rule.
C_{ij}=A, B = max k[(min (a_{ik}, b_{kj}))], where A=[a_{ik}] , B=[b_{kj}] and C_{ij}=fuzzy matrix.

Table 11
FUZZY MICMAC STABILIZED MATRIX

Enablers	**E1**	**E2**	**E3**	**E4**	**E5**	**E6**	**E7**	**E8**	**E9**	**DrP**
E1	0	0	0	0	0	0	0	0	0	0
E2	0	0	0	0	0	0	0	0	0	0
E3	0	0	0	0	0	0	0	0	0	0
E4	0.9	0.9	0.9	0	0.9	0	0	0	0	3.6
E5	0.9	0	0.9	0	0	0	0	0	0	1.8
E6	0.9	0.9	0.9	0	0.9	0	0.9	0	0	4.5
E7	0.9	0.9	0.9	0	0	0	0	0	0	2.7
E8	0.9	0.9	0.9	0.9	0.7	0.9	0.9	0	0	6.1
E9	0.9	0.9	0.9	0.9	0.9	0	0.9	0	0	8
DP	5.4	4.5	5.4	1.8	6	0.9	2.7	0	0	

Note: DP-Dependence Power; DrP-Driving Power

The stabilized matrix is shown in Table 11. Sum of row values determine the driving power of enabler in that particular row and sum of column values determine the dependence power of enabler in that particular column.

MICMAC performs structural analysis to measure the indirect relationship rather than direct relationship. All the factors are classified into four clusters placed into four quadrants according to their dependence and driving powers Figure 2.

These four clusters are named as autonomous, dependent, linkage and independent.

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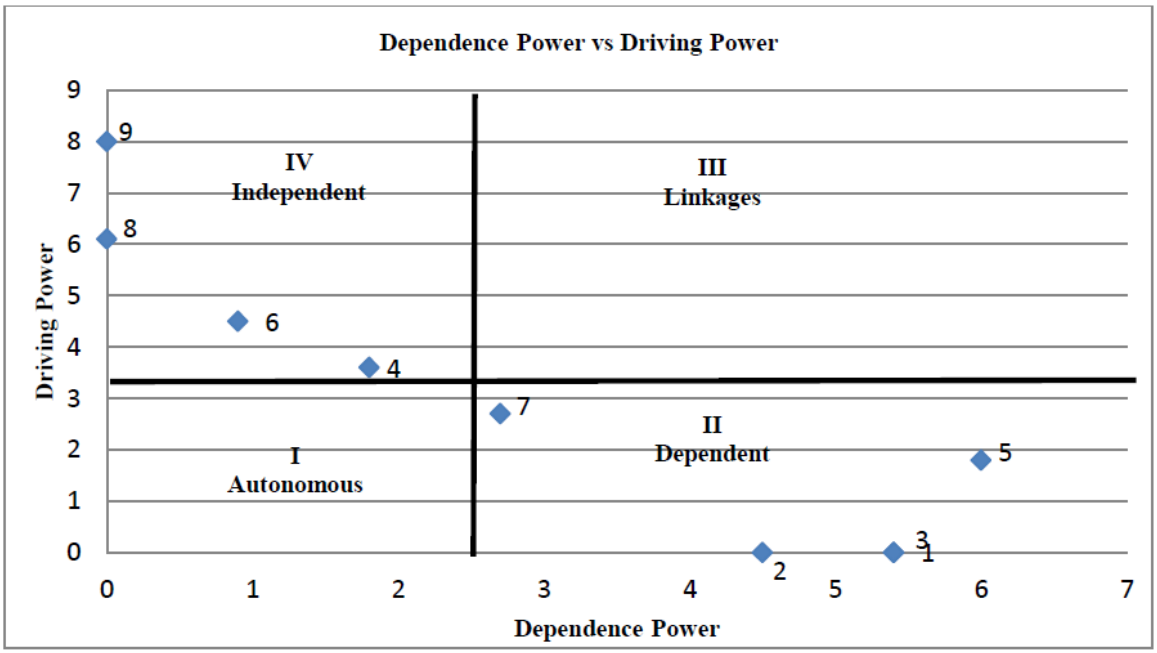

FIGURE 2
FUZZY MICMAC ANALYSIS

DISCUSSION

Through extensive literature review and discussions with experts, this interdisciplinary research idea has been developed. Firstly, recent trend in industry has been identified i.e. customer experience which belongs to marketing field. Secondly, nature of Cx has been studied and the constructs customer satisfaction, loyalty intention and word-of-mouth behaviour that are used to measure the Cx are identified. Thirdly, constructs that have significant impact on Cx has been identified and described Table 1. Fourthly, stages of customer journey have been studied and the role of IT during this journey has been listed Table 2. Fifthly, important dimensions of IT have been identified. These five efforts have given nine interdisciplinary research items for further research. Next step of this research was to establish the hierarchical relationship between the research items to understand the dependency relationship among them. This task has been executed with the help of ISM technique. ISM technique results into a graphical model where items are placed at different levels and relationship between them is represented with help of directional arrows Figure 1. From Figure 1 it has been observed that items of IT management strategic, alignment (E8) and adoption level (E9) are placed at highest level (level VI). It indicates the importance of these items in the hierarchy. These items have power to determine the rest of research items under study directly or indirectly. Model also shows the direct relationship between these items. It means if the IT strategies are aligned with organisational strategies then it determines the adoption level of IT in the organisation. At level V two items product experience (E4) and moments-of-truth (E6) are placed and are related. Moments-of-truth directly determine the product experience. These two items are directly influenced by the IT related items place at level VI. Items placed at level V determine the peace-of-mind (E7) which is place at level IV. Peace-of-mind is responsible keeping the customer, outcome focused (E5). It

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shows the confidence of customer in the products/services of the firm. This item has secured place just above the level IV i.e. level III. Outcome focused behaviour of customers determines the customer satisfaction (E2) which is placed at level II. Customer satisfaction inculcates loyalty intentions (E1) and word-of-mouth behaviour (E3) in customers which is the ultimate goal of any organisation. These items are placed at level I.

The next objective of this research was to analyse the research items on the basis of their driving and dependence power. This objective has been achieved with the help of integrated ISM-fuzzy MICMAC approach. This approach divides the research items into four groups (Figure 2). Details are as follows.

Autonomous Items

Items that have low driving power and low dependence power belongs to this group. This research has not identified any item for this group. It indicates that all the items included in this study are important.

Dependent Items

Items having strong dependence and low driving power are placed in this group. Research items 'loyalty intentions (E1)', 'customer satisfaction (E2)', 'word-of-mouth behaviour (E3)', 'outcome focus (E5)' and 'peace-of-mind (E7)' are placed into this group. It indicates the significant dependency of these items on the other items considered for this study. So management should careful about these factors because change in these factors occurs mainly due to changes in rest of the factors.

Linkage Items

Items that have strong driving power as well as strong dependence power are placed into this group. Items placed into this group indicate that these are the most sensitive items among all the items considered for the analysis. Any changes in system will affect these items. This research has not identified any item for this group.

Independent Items

Items that have high driving power and low dependence power are placed into this group. Four items 'product experience (E4)', 'moment-of-truth (E6)', 'strategic alignment (E8)' and 'adoption level (E9)' have secured place in this group. Changes in these items will bring significant change in the system or variables.

CONCLUSION

Firstly this study identifies the customer experience as a critical area for the sustainability of organisations. Secondly, various dimensions of customer experience has been identified and listed. Thirdly, marketing outcome variables are identified where the impact of Cx is observed. Fourthly, realising the potential of IT, its dimensions are identified. Fifthly, items of customer experience, marketing outcome and IT management are arranged hierarchy wise and relationship between them is represented with the help of ISM techniques. At last research items are analysed on the basis of their driving and dependence power with the help of integrated ISM-fuzzy

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MICMAC approach.

This research identifies items of IT management as a critical components which have highest driving power. These components have significant direct and indirect impact on the various dimensions of Cx and marketing outcomes. So, if organizations are serious about Cx then they should not ignore the IT in their strategies.

Any possible bias in this research can provide scope for future research. Relationship between the items has not been assigned weight this could be done with the help of structural equation modelling (SEM). Instead of MICMAC analysis fuzzy MICMAC analysis could be used for more precise result.

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