

E-commerce Utility and Service Quality Enablers: A TISM Approach

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ABSTRACT

Consumer demand for e-commerce services has skyrocketed due to the introduction of social distancing standards and lockdown measures that countries have taken to combat the pandemic. There has been a notable surge in the popularity of on-demand delivery services, with a significant influx of new users turning to the e-platform for assistance. This research paper tries to identify the enablers of E-commerce Utility and Service Quality and establish a connection using total interpretive structural modelling (TISM). Enablers are the building blocks for providing customers with an enhanced and more consistent service experience contributing to service quality. The enablers and the linkages thus established hold valuable insights for e-commerce marketers, aiding them in effectively reaching their customers, and achieving desired growth outcomes. The TISM- based model and the MICMAC analysis identified two barriers; website design and personalization as the decisive attributes of e-commerce service quality, possessing strong driving power and weak dependence. Furthermore, the factors of reliability, responsiveness, information, and ease of use form the linkage zone, indicating that any action taken on these factors would not only influence other factors but also have a reciprocal effect on them.

Keywords: E-commerce, Service Quality, Total Interpretive Structural Modelling, Enablers

I . Introduction

The global retail market soared to a staggering US\$23 trillion in 2020, showcasing a remarkable trend of consistent growth year after year. This unprecedented surge has induced an enormous growth opportunity for the e-commerce industry which is now an indispensable component of the global retail

framework. With the advent of the internet, and the digitalization of modern life, consumers across the globe are relishing the countless advantages offered by e-commerce. The increasing use of smartphones and other mobile devices, and the fact that the global internet users have increased to five billion, in turn, have accentuated online purchases making it possible for consumers to shop online from any-

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where at any time. As per the latest report from Statista, e-commerce retail sales worldwide have clocked 8.1 trillion USD and its share is forecasted to be 24% of the total global retail sales by 2026. This reveals the fact that businesses of all sizes are taking advantage of the convenience and accessibility of online shopping.

Cross-border sales in e-commerce are expected to advance at a rate of 25% per year on average which will direct the globalisation of the e-commerce market (Terzi, 2011). The dynamic rise of the e-commerce sector has been accelerated by the increasing use of smartphones and the internet, which has led to a digital revolution across all countries (Bilgihan et al., 2016).

E-commerce was intentionally selected as the focus of interest of the study due to its wider acceptance in the current business. The greater convenience that e-commerce provides consumers is one of the primary factors driving its rise. With a few clicks, consumers can shop anything from the comfort of their own homes, hence widely gaining acceptance from elders, those who have mobility issues, and also for those living in rural areas. E-commerce enables businesses to reach a wider audience, unlike the traditional store which is restricted to a geographical area. This allows businesses to tap into new markets and can bring in phenomenal improvement which is otherwise impossible within this short time span. Furthermore, it has made it easier for consumers as well by getting access to a wider range of products, can easily compare prices, features, read reviews and make informed decisions and better value for money thereby giving more control over their shopping experiences.

E-commerce has made a positive impact on the global economy. It has created new job opportunities, both directly and indirectly, and has helped to drive

an economic upsurge in many countries. E-commerce has also made it easier for small and medium-sized businesses to compete with larger companies, helping to promote competition and innovation. The benefits it thus offers to consumers, businesses, and the economy are quite a reason for being a key player in the global marketplace.

In the e-commerce industry, the understanding of market fit by an organization is more vital than the analysis of the market size of the firm as this is different from any other industry as the variability in virtual customer interaction and experience determines the sales. The expansion of the e-commerce market beyond the Western continents like the emergence in North America and Europe has been observed (Travica, 2002). This is evident from the fact that on average 57% of online customers or shoppers have been involved in a purchase from an overseas retailer.

An organization's success in operations is driven by the achievement of an optimum level of service quality. The entire assessment and judgment of the client regarding the delivery of the e-service over the virtual marketplace platform are referred to as e-service quality (Yen and Lu, 2008). The gap between the customer's expectation for the performance of the service prior to encountering it and the customer's impression of the actual service received may be characterised as the quality of the e-service delivery. Customers will usually consider the service to be low if the performance is not up to expectation whereas the perception is ranked high when the performance exceeds the expectation of the customer. In order to build long-lasting customer relationships and loyalty, companies are focusing on ways to improve the e-commerce service quality before, during and as well as after the transaction for services or products through the online platform (Ndubisi et

al., 2011). In building a sustainable organisation, service quality has an important role and is often considered the most significant one. In developing countries, the empirical study on important constructs of e-commerce is usually limited as compared to developed countries.

According to the World Trade Organization, the Covid-19 situation has underlined the importance of e-commerce and cross-border collaboration in the movement of goods and services. As a result of the enforcement of social distance, lockdowns, and other measures in response to the COVID-19 epidemic, consumers have increased their usage of online activities like virtual shopping, social networking etc. (Naseri et al., 2021) have examined the issues and challenges of online shopping activities during this period.

During the COVID-19 pandemic time, Dirgantari et al. (2020) used the information system success model (ISSM) technique to measure the level of use and happiness of e-commerce customers, which was created by system quality, information quality, and service quality. The effective measure of customer satisfaction for the e-service quality and utility is proposed in this paper which is carried out on the SERVQUAL scale. They opined that the assessment of the service quality dimension over the online platform is different from the service delivered in the physical marketplace.

It is a reality that the Covid-19 pandemic made the significance of e-commerce all the more relevant. Taher (2021) beautifully narrates the merits and limits of E-commerce, highlighting its pivotal role in supporting the industry and thereby the economy's sustainability during the Covid-19 pandemic, eventually helping society at large. As Governments around the world implemented lockdowns and restrictions on movement, consumers had no other options ex-

cept online purchases which again led to a surge in e-commerce activity. Latin America & the Caribbean (LAC) has been reported as the hardest hit regions by the Covid-19 pandemic as per the largest fall in GDP in history. Nevertheless, digital trade transactions skyrocketed and the e-commerce penetration in the region has jumped years forward, accelerating the digital process after the pandemic. The report depicts how consumers increasingly turned to online platforms for purchasing groceries, electronics and furniture, etc. online. as the pandemic got extended (CEPAL and Adenauer, 2021).

Sheth (2022) has tried to articulate the impact of Covid -19 on marketing and how fast consumers and marketers are willing to shift to e-commerce and digital platforms. The paper sheds light on the imperative for consumers, marketers, manufacturers and service providers to change their habits, practices and processes of buying and selling as well as their consumption and post-purchase consumer support through technology. Embracing technological advancements, e-commerce is also evolving thus posing various challenges. The issue of security was identified as one of the prominent challenges which accompany online transactions akin to the risk of fraud and data breaches. This invigorated an inspiration to conduct a detailed analysis to map the various enablers of E-commerce utility and service quality with an intention to improvise the service standards. Post-pandemic, as the global economy continues to evolve, e-commerce will play an even larger role in the years ahead thus making the study more relevant and appropriate.

1.1. The Rationale of the Study

E-commerce in India is no different from the global scenario. Since the pandemic, e-commerce in India

is sitting on a gold mine. According to reports from the Department of Commerce, Ministry of Commerce and Industry, Government of India, the Indian retail sector has emerged as one of the most dynamic and rapidly growing sectors. The Indian retail sector, with an estimated US\$883 billion, contributes to more than 10% of the country's GDP and is ranked as the world's fifth-largest retail destination. E-commerce has gained a significant proportion in recent years with an additional 40 million new online buyers. Indian consumers were tilting towards online shopping due to its convenience, internet penetration driven by the "DigitalIndia" programme, the proliferation of smartphones, and the change in consumers' lifestyles. The online retail market is growing at a phenomenal rate thus opening avenues for e-retailers in India to capitalize and is estimated to reach 10.7% in 2024 from 4.7% in 2019 of the total retail in India thereby constituting 25% of the total organised Indian retail market. This further explains the futuristic growth prospects of the online retail industry in India.

The hike in internet users, smartphone penetration, and the young earning population are some of the factors which have triggered the exponential growth of e-commerce. It is absolutely certain that the rollout of 5G broadband technology will accelerate the expansion of e-commerce to new heights. According to ibef.org, in 2020 India had 140 million online shoppers, placing it third behind China and the US. JP Morgan's report also corroborates the viewpoint that the digital gap between urban and rural India is getting narrowed and e-commerce can find its way by roping in potential customers across India's vast geography. India now has 830 million internet connections, has the second highest number of active internet users worldwide, and is one of the biggest data consumers in the world. India's

e-commerce market had a significant sales hike in 2021 and a growth of 21.5% is predicted for 2022.

A quick inference of all these facts and figures boils down to the fact that there is a phenomenal change in consumer purchase behaviour. It is also understood that subsequent to an unprecedented decline in retail sales like in any other industry when the pandemic first started, the industry bounced back to its growing phase. It is quite comforting to notice that consumers are resilient and so is the retail industry which is recuperating to touch new heights of growth, in the post-pandemic. The shopping behavior however has tremendously changed and consumers started to prefer online shopping and thus significantly cutting back on in-store visits, and demanding contactless delivery, curbside pick up etc. This in turn has forced companies to operate omni-channel mode wherein online retail is becoming increasingly ubiquitous than ever before. This shift in consumer purchase behaviour has propelled the exponential rise of e-commerce. Thus one of the prime reasons to conduct a study on Indian e-commerce is to identify potential opportunities for businesses. The outcome of this study will enable business houses looking to tailor their offerings and market strategies to the Indian market in the post-pandemic phase.

Having this in the backdrop, it makes sense for the companies to explore the factors that could enhance the service quality and utility of the e- platform which consumers now resort to, for purchasing household items ranging from groceries to white goods. It is critical that the higher the quality of service and usefulness received by users, the greater their desire to continue to utilise the e-platform. This makes the study significant in suggesting ways for companies to improve the ease of use and make the interface more customer-friendly.

1.2. Statement of the Problem

E-commerce is selected as the area of study only because of its growing prominence and its scope in the coming years. The pandemic pushed many sectors to operate online and this study is done on online retail, confining to grocery which was considered an essential service. Besides, the statistics reveal that Indian e-commerce is expected to reach US\$99 billion by 2024, with groceries serving as one of the key factors driving incremental growth. Though there are previous studies available on the different factors of service quality, it was identified that there is an absence of empirical studies on the relationship between these factors applying TISM method which makes this study unique. In order to further encourage the expansion of e-commerce in the nation, this study aims to identify the enablers of service and their importance. This necessitated framing the research questions as given in the next section.

1.3. Research Questions

What are the significant enablers that play a pivotal role in the service and utility of e-commerce business?

How do the enablers of service quality and utility impact the e-commerce business?

II . Literature Review

Consumers consider quality to be the most important concern in service industries (Suchismita et al., 2012). Service quality is challenging to evaluate because of various factors that comprise service quality and the effects of customer expectations on the service quality measurement (Kasiri et al., 2017). The service sector's segment comprises of a wide range

of organisations and firms, which are generally classified under national and local government services such as health, education, transport and the military, non-profit services such as charities and research foundations and for-profit services such as hotels, consultancy firms, marketing and entertainment companies (Jain and Aggarwal, 2018; Marquand, 2018). These companies have identified quality, customer satisfaction and value to the customer as important factors which affect their business. The majority of service quality dimensions are concerned with the technical and functional components of the service delivery process (Rejikumar et al., 2019). Quality has a major impact on parameters like customer satisfaction, customer retention, purchase decision and loyalty. The management of service quality is a key aspect of strategy development. The efficient operation of a service organisation necessitates service quality that improves customer satisfaction (Gill, 2009) and increases the firm's competitiveness (Wali and Nwokah, 2018).

E-commerce industries have become competitive and customers involved in exchange through virtual online marketplace platforms are focusing more on the quality of service delivery and transaction. Services are intangible, heterogeneous, perishable and inseparable (Parasuraman et al., 1985) and judgments of their quality are based on a variety of factors (Yarimoglu, 2014). The utilities of these e-commerce companies are a challenging area of study for the researcher as they are different from the regular service provider in terms of their inherent characteristics. Lai et al. (2012) have described that service convenience (SERVCON), a concept explaining customer satisfaction, benefits and customer retention, has now been accepted as a major factor determining the online shopping behaviour of customers. Customers may easily make use of internet services

with the least amount of time, money, and effort (Hofacker, 2001). Consumers today are facing the scarcity of time and effort in searching for products or services information and therefore e-commerce is not only a convenient option but also the need of customers (Seiders et al., 2000). Seiders et al. (2007) emphasising that e-service firms' performance increases with competition in the marketplace and therefore eventually improves the service quality delivery attribute of the firm. Capps (2009) stated that in the e-commerce market, competition is increasing, forcing enterprises to provide excellent service quality and thereby altering consumers' perceptions of quality to convenience. In e-commerce environment, the service objects' perception of the service quality provided by the e-commerce provider is a crucial factor to measure the development of e-commerce (Tong and Lin, 2015).

Parasuraman et al. (1988) has developed the SERVQUAL scale to assess the perceived quality of service and is used globally as a judgement measuring / for the superiority of a given service. SERVQUAL, according to Zeithaml et al. (1990), can be applied in a variety of industries or businesses with adequate interpretation. Later, the SERVQUAL scale was re-framed in order to formulate a scale that covers five factors like information, design, usability, empathy, and trust. Van Riel et al. (2004) described that reliability, design, navigation, accessibility, service quality and customization are stated as e-service quality important determinants for online websites related to the travel industry. When a service meets or exceeds the customer expectations, it is deemed satisfied. By achieving customer satisfaction the service provider or company could gain customer loyalty and trustworthiness. This leads to profitability and greater economic benefits for the firm. This model has also been used by different researchers in order

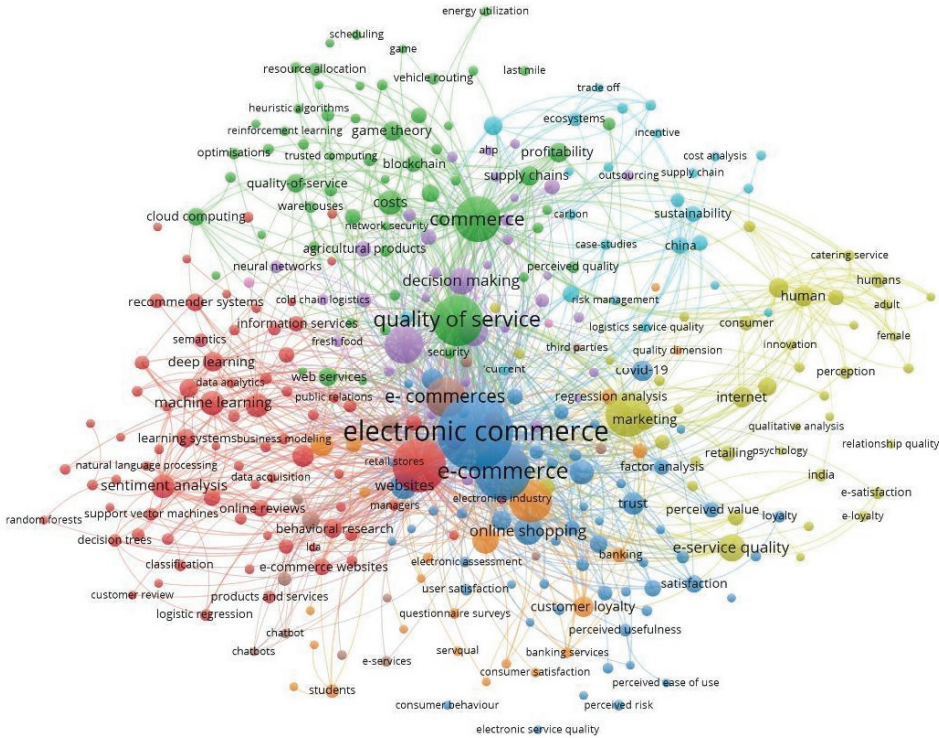
to identify the interrelationships among different factors associated with the problem. In their scholarly article titled "Impact of e-service quality & consumer satisfaction consumer behaviour in online shopping" Rita et al. (2019) have undertaken a comprehensive study encompassing on- line stores in general and they emphasized the need for future research studies focusing on specific product categories. The study was conducted in Indonesia and they have asked to replicate it in other cultural contexts. The present study has effectively addressed both of these aspects. In the study conducted by Holloway and Beatty (2008) they tried to figure out the factors driving consumer dis (satisfaction)in the online service environment. They have deployed CIT (critical incident technique) which is not void of issues of validity and reliability as they themselves have stated. Hence they suggested alternative methodology which is well addressed in our paper by adopting the TISM method. Raval and Bhatt (2021) have done a comprehensive study and the result unravels the relationship between the eight service quality factors of online shopping platforms and customers' experience in online retail. The study concluded by suggesting future studies urging to focus on antecedents and outcomes of customer experience towards service quality of online shopping platforms.

Against the backdrop of extensive studies in the field, the researchers have downloaded 800 articles using the key words. VOS viewer (a software tool for constructing and visualising bibliometric networks) enabled the researchers to extract 334 items (key words) from it, which is exhibited in <Figure 1>.

The 334 items were grouped into 9 clusters. Each cluster defines a common theme based on the key words. The researchers focused on those clusters that were relevant to the theme of the paper that dealt with the enablers of e-commerce. Moreover these

factors were compared with several important scales and other literature on the topic which enabled the researchers to finalise on the variables and sub-

sequently design the questionnaire. The researchers did an in depth review of those factors. The summary of the literature review is given in <Table 1>.



<Figure 1> Bibliometric Networks

<Table 1> Literature Review

| Sno | Year of Publishing | Authors | Title | Key Variables | Findings |
|-----|--------------------|---------------|---|---|---|
| 1 | 2022 | Ambad et al. | Determinants of Consumers' Purchase Behaviour Towards Online Food Delivery Ordering | Consumer adoption, consumer behavior, online food delivery ordering, positive online comments | customers prefer OFDO due to user-friendly interface, ease of ordering. Reference groups, positive online comments etc affect online food delivery services |
| 2 | 2022 | Casare et al. | Do dependable systems need good user interfaces? | Dependability, trust, trustworthiness, user interface | The article tried to assess the trustworthiness of computational systems in User interface along with factors of dependability, security, connectivity, scalability |

<Table 1> Literature Review (Cont.)

| Sln0 | Year of Publishing | Authors | Title | Key Variables | Findings |
|------|--------------------|----------------|---|--|--|
| 3 | 2021 | Akgul | SEM: Artificial Neural Network-Based Research of Customer Satisfaction and Behavioral Customer Loyalty in Mobile Shopping–The Role of E-Service Quality and E-Recovery. | E-service Quality, Customer satisfaction, confidentiality, responsiveness, Artificial Neural Network | Effectiveness of information content, hedonic shopping value, responsiveness, information security and confidentiality & website entertainment have positive impact on customer satisfaction |
| 4 | 2021 | Arilaha et al. | Customer Perception of E-service Quality: An Empirical Study in Indonesia | Customer perception, E-service Quality, Online shopping, Responsiveness, Reliability | E-service quality (web design, responsiveness, reliability, trust & personalisation) has a positive effect on customer perception |
| 5 | 2021 | Casare et al. | Towards usability interface trustworthiness in E-commerce system | Trust, trustworthiness, user experience, e-commerce, questionnaire, metrics | Identified and complemented a set of attributes that characterizes the perceived feeling of trust by the user & formulated a set of trustworthiness measures |
| 6 | 2021 | Raval et al. | Assessment of service quality of selected online shopping platform | Online shopping platform, E-service Quality, Quality dimensions | Identified various service quality factors that affect the behaviour and experience of online consumers |
| 7 | 2020 | Hidayat et al. | Analysis of E-service quality on Website E-Commerce on E-commerce satisfaction | E-satisfaction, e- service quality, information quality, usefulness, e-trust, e-commerce | Information quality, e-service quality, usefulness and e-trust have effect on e-satisfaction variable |
| 8 | 2020 | Johan et al. | The relationships between Web Design, Reliability, Privacy, Service Quality, and Purchase Intention of Customers at E-commerce Business: An Empirical Study | Website design, reliability, privacy, customer service | Customers' perception of factors influence purchase intention and reliability being the most |
| 9 | 2020 | Khan et al. | Service quality dimensions and customer satisfaction in online shopping: A customer's perspective. | E-service Quality, E-commerce, Customer satisfaction, B2C, Cash on Delivery | Website design, reliability, trust & privacy has impact on customer satisfaction whereas responsiveness has no such impact |
| 10 | 2020 | Mbete et al. | Effect of Easiness, Service Quality, Price, Trust of Quality of Information, and Brand Image of Consumer Purchase Decision on Shopee Online Purchase. | Customer trust, Easiness, Information quality, Purchase decision, Quality of service, TAM | Ease & brand image has a positive impact on online purchase decisions, whereas other factors have no such impact |

<Table 1> Literature Review (Cont.)

| Sln0 | Year of Publishing | Authors | Title | Key Variables | Findings |
|------|--------------------|---------------------|--|---|---|
| 11 | 2020 | Nandakishore et al. | Key quality of service attributes of digital platforms. | Digital Platforms, Quality Attributes, Education Technology Platforms, Healthcare Platforms | Service quality factors are important for the success of the platforms. Besides fitness for use is a major determinant in digital platforms |
| 12 | 2020 | Hidayat et al. | Impact of e-service quality on customer satisfaction | E-service quality, information quality, e-commerce | The information quality, e-service quality, usefulness, and e-trust have an effect on e-satisfaction variable |
| 13 | 2020 | Ritonummi | User experience on an e-commerce website: A case study | User experience, website design, ecommerce | Company's website is successful when it comes to usability, pragmatic quality of interaction |
| 14 | 2019 | Rita et al. | Impact of e-service quality and customer satisfaction on consumer behavior in online shopping | E-service quality, online shopping, customer satisfaction, retailing, information science, consumer behavior, security | Website design, security and fulfillment are essential to building superior service quality of an online store, while customer service is not an important dimension of e-service quality in the Indonesian context |
| 15 | 2016 | Blut | E-service quality: Development of a Hierarchical Model | Online retailing, online service quality, scale development in which factors like information quality, website personalization etc.. in formulating the hypothesis. | Developed a new measurement enables managers to assess e-service quality more accurately and predict customer behaviour |
| 16 | 2015 | Choi et al. | Leveraging accumulated customer knowledge in electronic knowledge repositories for superior customer service | Accumulated Customer Knowledge, Knowledge Management, Knowledge Utilization, Service Expertise, Service Quality | Accumulated customer knowledge in EKR(electronic knowledge repositories) enhances CSR's knowledge utilization & service expertise leading to superior service quality |
| 17 | 2013 | Han et al. | An Empirical Study on the Influencing Factors of Intention to Adoption of Mobile Government Service | M-government Service, Intention to Adoption, Service Quality Factors, Relationship Quality, Public Quality, TAM | Service quality, system quality, and relationship quality are identified as influencing factors to adaption of M-government service. |
| 18 | 2013 | Jiang et al. | Measuring consumer perceptions of online shopping convenience | Consumer behaviour, Electronic commerce, Convenience, Online shopping, perception | The study focused on uncovering the key dimensions of convenience and their associated subdimensions specific to the context of online shopping |

<Table 1> Literature Review (Cont.)

| Slno | Year of Publishing | Authors | Title | Key Variables | Findings |
|------|--------------------|---------------------|--|--|--|
| 19 | 2010 | Kwon et al. | Impact of Website information design factors on consumer ratings of web based auction sites | Website information, Information design factors | Information design factors and the specific characteristics of products are significantly related to a buyers evaluation of an auction website and intention to bid |
| 20 | 2009 | Li et al. | Measurement of E-service Quality: An empirical study on Online Travel Service | E-service quality, SERVQUAL, Online Travel service | Online travel service companies should pay attention to the facets of reliability, system availability and responsiveness while focusing on the facets of ease of use and trust in order to improve their online travel service quality to customers |
| 21 | 2008 | Holloway and Beatty | Satisfiers and Dissatisfiers in the online environment- A Critical Incident Assessment | Online retailing, online service encounter, online service quality | Helps in understanding the sources of satisfactory and dissatisfactory online service encounters |
| 22 | 2004 | Yang and Fang | Online service quality dimensions and their relationships with satisfaction: A content analysis of customer reviews of securities brokerage services | E commerce, Internet, Servicing, Customer satisfaction | Primary service quality dimensions leading to online customer satisfaction, with the exception of ease of use, are closely related to traditional services while key factors leading to dissatisfaction are tied to information systems quality |

III. Research Methodology

This section vividly illustrates the methodology employed for the analysis, culminating in a meaningful and conclusive outcome. In order to measure the e-commerce utility and service quality, a structured questionnaire has been designed. The survey focused on 26 items in order to evaluate the responder's view on the service quality and utility of e-commerce as given in Annexure 1. The study was conceived during late 2020's and was conducted during early 2021, with the onset of e-commerce emerging as a business model. The sampling approach employed is judgmental sampling, which involves the researcher's expert judgment and selection of participants based on their knowledge and expertise.

A sample size of 200 was determined for the study and the survey was conducted, however 78 responses were rejected as they couldn't fulfill the inclusion criteria. The sample inclusion criteria was that those respondents who had been purchasing groceries through online platforms were only considered for the study. A Likert-type scale of five-point was suggested to the responder of the survey to answer each element of the questionnaire.

TISM is used to obtain structural relationships among these enablers of service quality. TISM was selected as the methodology to accomplish the objective since the purpose of this study is to model the facilitators of service quality and usefulness in an e-commerce context. TISM considers the contextual relationship between each enabler and every

other enabler and identifies which enablers drive or influence others and which enablers are dependent on others. The researchers have opted for TISM due to various reasons, some of which are its ability to comprehend the system as a whole, leading to a more holistic understanding and prioritizing relationships based on their significance and impact on the overall system. The peculiar nature of TISM in managing complexity by breaking down complex systems into manageable components and understanding their relationships makes it suitable for use in this study.

TISM methodology is considered as an extension of interpretive structural modelling (ISM) (Sushil, 2012, 2018; Warfield, 1974). ISM is a computer-assisted modelling methodology that can use three modelling languages: words, visuals, and mathematics (Mishra et al., 2015; Soti et al., 2010). ISM is an approach for addressing complicated problems that models qualitative or subjective factors measured on ordinal scales. (Janes, 1988; Satapathy et al., 2012). Attri et al. (2013) explained interpretive structural modelling (ISM) as a well-framed model for solving an issue or problem by finding relationships among this issue. The ISM methodology was utilised by Vignesh and Suresh (2016) in their investigation of lean practices in supermarkets. However, ISM has its own constraints. To begin, it is unable to offer an accurate interpretation of the way in which the directed links function. Second, it does not offer any explanation related to transitive links and causality of the linkage between building blocks of the ISM (Sushil, 2012). Addressing these limitations, Sushil (2012) proposed TISM which explicitly captures the causal thinking behind the interrelationship during data collection. Shibin et al. (2017) identified the enablers of sustainable supply chain performance using the TISM method. It is used to identify the

interrelationship between and among the factors that influences the e-commerce utility and service quality. TISM has been used for analysing factor's relationships in manufacturing and service industries (Dubey, 2015). In this study, TISM analysis is executed in three phases. The first phase includes the identification of enablers of e-commerce utility and service quality. The analysis of enablers using the TISM model is performed in the second phase and the third phase consists of the Cross-Impact Matrix Multiplication Applied to Classification.

The TISM (Total Interpretive Structural Modeling) process, as described by Sushil (2009, 2012), consists of the following steps:

- Step I: Identify and define elements
- Step II: Define contextual relationship
- Step III: Interpretation of relationship
- Step IV: Interpretive logic of pair-wise comparison
- Step V: Reachability matrix and transitivity check
- Step VI: Level partition on reachability matrix
- Step VII: Developing digraph
- Step VIII: Direct interaction matrix
- Step IX: Total interpretive structural model

The present paper focuses on the identification of the enablers of the factors influencing e-service quality and utility by developing the TISM model. The analysis section impeccably presents the steps involved in TISM.

IV. Analysis

The analysis is carried out in three phases. The first being the factor analysis followed by TISM model and finally by the MIC MAC analysis. To identify the enablers for the study, the initial step involves

conducting an exploratory factor analysis.

4.1. Phase 1

4.1.1. Identification of Enablers

In order to identify the enablers, a factor analysis has been carried out with the factor loadings given in <Table 2>. Factor analysis is used to discover the primary dimensions of the elements that influence the utility and service quality of e-commerce. Respondents expressed their views regarding the e-commerce utility and service quality. A factor analy-

sis with principal component analysis as the extraction method and varimax rotation was performed on 26 items.

The Bartlett’s Test of Sphericity and the KMO measure of Sampling Adequacy are used to determine whether the data are suitable for factor analysis using SPSS 21. KMO is found to be 0.795 suggesting adequate sample size. The Barlett test of sphericity is significant which demonstrates the suitability of testing multidimensionality. The items are loaded into 7 factors with factor loadings given in <Table 2>.

Following the identification of the 7 enablers, a questionnaire is prepared for comparing each enabler

<Table 2> Factors and Elements

| Factors | Items | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Reliability | 2 | 0.687 | | | | | | |
| | 5 | 0.585 | | | | | | |
| | 9 | 0.725 | | | | | | |
| | 21 | 0.592 | | | | | | |
| Security | 3 | | 0.425 | | | | | |
| | 6 | | 0.592 | | | | | |
| | 10 | | 0.595 | | | | | |
| | 18 | | 0.754 | | | | | |
| | 19 | | 0.792 | | | | | |
| | 25 | | 0.577 | | | | | |
| Responsiveness | 12 | | | 0.668 | | | | |
| | 13 | | | 0.691 | | | | |
| | 14 | | | 0.559 | | | | |
| | 15 | | | 0.714 | | | | |
| Website design | 7 | | | | 0.797 | | | |
| | 16 | | | | 0.824 | | | |
| | 17 | | | | 0.596 | | | |
| Information | 8 | | | | | 0.445 | | |
| | 20 | | | | | 0.701 | | |
| | 24 | | | | | 0.765 | | |
| Ease of use | 1 | | | | | | 0.548 | |
| | 4 | | | | | | 0.832 | |
| Personalization | 11 | | | | | | | 0.766 |
| | 22 | | | | | | | 0.526 |
| | 23 | | | | | | | 0.425 |

against another. Responses of the individual experts are compiled

4.2. Phase 2

4.2.1. Analysis Using TISM

The steps of TISM includes:

1. Identifying the factors that influences the customer satisfaction in service quality of e commerce utility service

2. Establishing and evaluating the circumstantial relationship between elements towards different pairs of elements through an initial reachability matrix (IRM)

3. In the TISM methodology this step helps to identify how the factor i influences factor j by designing a Structural Self-Interaction Matrix using elements and displaying the relationship among the elements of the given framework in a pair-wise manner.

4. Designing a reachability matrix from the above mentioned structural self-interaction matrix and evaluating transitivity in the matrix. The transitivity of the circumstantial relation is a fundamental assumption in interpretive structural modelling and it explains that if element A is associated with B and B is associated with C, then A is associated

with C.

For examining the elements informing Structural Self-Interaction Matrix, the below mentioned four symbols have been deployed to indicate the relationship direction between elements (for example i and j):

V- Element i will help to attain element j;

A- Element j will help to attain element i;

X- Element i and j will help to attain each other; and

O- Elements i and j are discrete.

The above mentioned four symbols are used to establish the interrelationship among all the 7 barriers (Reliability, Information, Security, Ease of use, Responsiveness, Website Design, and Personalization) which are displayed in <Table 3>, differentiating between weak and strong relations.

Level Partition

V, A, X, and O in the Structural Self-Interaction Matrix is exchanged by 1 and 0 as per the condition and hence is converted into a matrix of binary nature known as initial reachability matrix. The guidelines for the exchange of 1s and 0s are as mentioned below:

- Given the (i, j) listing in the Structural Self-Interaction Matrix is V, then the (i, j) listing in the reachability matrix exchanges to 1 and the (j, i) listing exchanges to 0.

<Table 3> Victograph

| Elements | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|-------------------|---|---|---|---|---|---|---|
| 1 Reliability | A | V | X | A | X | O | |
| 2 Security | O | A | O | A | X | | |
| 3 Responsiveness | X | V | O | A | | | |
| 4 Website design | V | V | O | | | | |
| 5 Information | O | O | | | | | |
| 6 Ease of use | A | | | | | | |
| 7 Personalization | | | | | | | |

- Given the (i, j) listing in the Structural Self-Interaction Matrix is A, then the (i, j) listing in the reachability matrix exchanges to 0 and the (j, i) listing exchanges to 1.
- Given the (i, j) listing in the Structural Self-Interaction Matrix is X, then the (i, j) listing in the reachability matrix exchanges to 1 and the (j, i) listing also exchanges to 1.
- Given the (i, j) listing in the Structural Self-Interaction Matrix is O, then the (i, j) listing in the reachability matrix exchanges to 0 and the (j, i) listing also exchanges to 0.

<Table 4> contains the associations of each of the seven elements transformed to an initial reachability matrix in accordance with the aforementioned guidelines, where “i” denotes the listing of seven

elements in the first column side by side in one direction, and “j” denotes the listing of seven elements in the first row in reverse order. Partition in level is framed for all the 7 elements and explained in the form of 0 and 1 in <Table 4>. The final reachability matrix is formed and displayed in <Table 5>. This interaction matrix is developed using the direct and significant transitive links. This table also includes dependence and driver power after the measurement of their values.

5. Dividing the above-obtained reachability matrix in the form of various levels. The final reachability matrix helps in the formation of antecedent and reachability sets for all the seven elements. The antecedent set comprises of the element itself and the other elements that guide in attaining it and the reachability set comprises the element itself and the

<Table 4> Level Partition

| Elements | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----------|---|---|---|---|---|---|---|
| 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |
| 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| 3 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| 4 | 1 | 1 | 1 | 1 | 0 | 1 | 1 |
| 5 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| 6 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 7 | 1 | 0 | 1 | 0 | 0 | 1 | 1 |

<Table 5> Final Reachability Matrix

| Elements | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Driving Power |
|------------|---|----|----|---|----|----|---|---------------|
| 1 | 1 | 1* | 1 | 0 | 1 | 1 | 0 | 5 |
| 2 | 0 | 1 | 0 | 0 | 0 | 1* | 0 | 2 |
| 3 | 1 | 1 | 1 | 0 | 1* | 1 | 1 | 6 |
| 4 | 1 | 1 | 1 | 1 | 1* | 1 | 1 | 7 |
| 5 | 1 | 0 | 1* | 0 | 1 | 1* | 0 | 4 |
| 6 | 0 | 1 | 1* | 0 | 0 | 1 | 0 | 5 |
| 7 | 1 | 1* | 1 | 0 | 1* | 1 | 1 | 6 |
| Dependence | 5 | 6 | 6 | 1 | 5 | | 3 | |

other elements that it may guide to attain. After the formation of both antecedent and reachability set, the intersection of these two sets for all the elements is obtained. The top level is achieved by an element in the interpretive structural modelling hierarchy when both the interaction set and reachability set are the same. Any other element above the top level element present in the modelling hierarchy is not attained by the help of the top level element. The top level is eliminated from the rest of the ele-

ments as soon as it is identified. The same procedure is then utilised to identify the constituents in subsequent stages. This procedure is repeated until the level of each element is determined, as shown in <Tables 6, 7, 8> and <Table 9>.

6. A digraph is constructed using the interaction matrix and level partition data. The elements at the top of the model are referred to as first level factors, while the other factors are arranged ascendingly. The enablers eliminated in the first iteration form the

<Table 6> Differentiation of Reachability Matrix: The First Iteration

| ELEMENTS | REACHABILITY SET | ANTECEDENT SET | INTERSECTION SET | LEVEL |
|----------|------------------|----------------|------------------|-------|
| 1 | 1,2,3,5,6 | 1,3,4,5,7 | 1,3,5 | |
| 2 | 2,6 | 1,2,3,4,6,7 | 2,6 | I |
| 3 | 1,2,3,5,6,7 | 1,3,4,5,6,7 | 1,3,5,6,7 | |
| 4 | 1,2,3,4,5,6,7 | 4 | 4 | |
| 5 | 1,3,5,6 | 1,3,4,5,7 | 1,3,5 | |
| 6 | 2,3,6 | 1,2,3,4,5,6,7 | 2,3,6 | I |
| 7 | 1,2,3,5,6,7 | 3,4,7 | 3,7 | |

<Table 7> Differentiation of Reachability Matrix: Second Iteration

| ELEMENTS | REACHABILITY SET | ANTECEDENT SET | INTERSECTION SET | LEVEL |
|----------|------------------|----------------|------------------|-------|
| 1 | 1,3,5 | 1,3,4,5,7 | 1,3,5 | II |
| 3 | 1,3,5,7 | 1,3,4,5,7 | 1,3,5,7 | II |
| 4 | 1,3,4,5,7 | 4 | 4 | |
| 5 | 1,3,5 | 1,3,4,5,7 | 1,3,5 | II |
| 7 | 1,3,5,7 | 3,4,7 | 3,7 | |

<Table 8> Differentiation of Reachability Matrix: Third Iteration

| ELEMENTS | REACHABILITY SET | ANTECEDENT SET | INTERSECTION SET | LEVEL |
|----------|------------------|----------------|------------------|-------|
| 4 | 4,7 | 4 | 4 | |
| 7 | 7 | 4,7 | 7 | III |

<Table 9> Differentiation of Reachability Matrix: Fourth Iteration

| ELEMENTS | REACHABILITY SET | ANTECEDENT SET | INTERSECTION SET | LEVEL |
|----------|------------------|----------------|------------------|-------|
| 4 | 4 | 4 | 4 | IV |

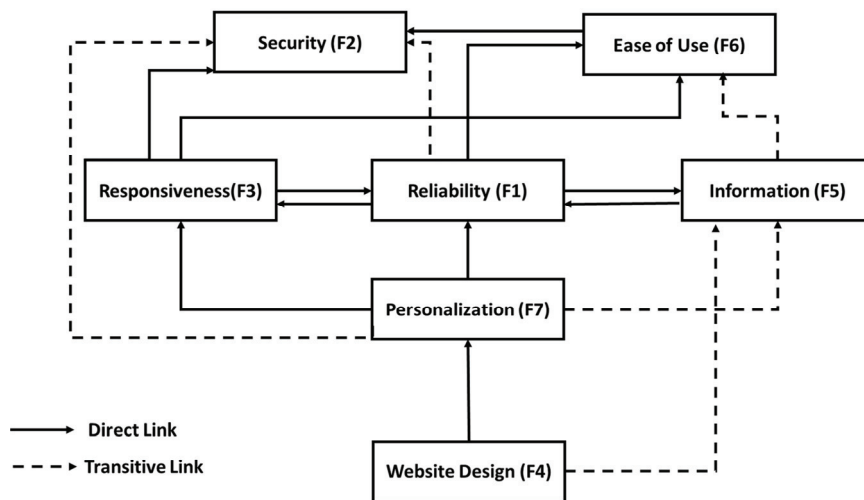
top position, while those eliminated in the fourth iteration form the bottom position. The digraph thus created is exhibited in <Figure 2> and the interaction matrix in <Table 10>.

4.3. Phase 3

4.3.1. MICMAC Analysis

It is employed to evaluate the driving force and dependence of the variables (Faisal et al., 2006; Mandal and Deshmukh, 1994). The acquired driver and dependence power of the barriers are plotted

in the MICMAC chart. The barriers are clustered under four different groupings namely the autonomous, dependent, linkage and the independent categories. The Autonomous barriers have weak driving power and weak dependence power. They do not interact with the system hence are omitted from further study. These are represented in Cluster I. Dependent barriers possess weak driving power but strong dependence on other factors are placed in Cluster II. Linkage barriers have strong driving power as well as strong dependence. These involve the barriers that highly impact the system and are shown in Cluster III. These are generally unstable and any



<Figure 2> Digraph

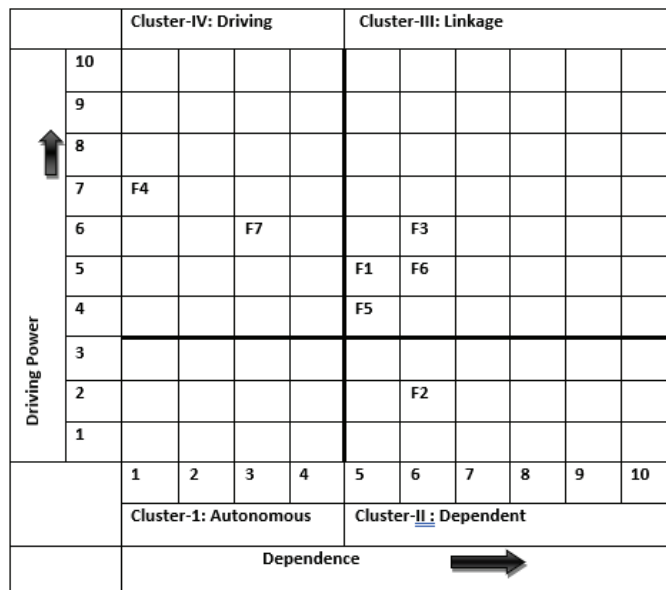
<Table 10> Interaction Matrix

| Elements | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----------|---|----|---|---|----|----|---|
| 1 | 1 | 1* | 1 | 0 | 1 | 1 | 0 |
| 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 3 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| 4 | 1 | 1 | 1 | 1 | 1* | 1 | 1 |
| 5 | 1 | 0 | 0 | 0 | 1 | 1* | 0 |
| 6 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 7 | 1 | 1* | 1 | 0 | 1* | 1 | 1 |

changes induced on them will have an influence on others and themselves. Independent barriers exhibit strong driving power but weak dependence and are represented in Cluster IV. In this study, MICMAC analysis is carried out for classifying the barriers into four clusters with respect to their driving and dependent power.

<Table 11> represents the MICMAC rank of the factors influencing the customer satisfaction of e-service quality and utility. <Figure 3> represents

the four clusters in which the factors are grouped with the help of mic-mac analysis to evaluate the power of dependence and driving that affects the e-commerce service utility and quality. It has displayed dependency on the x-axis and driver power over the y-axis. From the analysis, it is clear that there are no autonomous factors in the study. Factor 2 (security) is a dependent factor thus forming cluster II. This factor gets influenced when there is a change in the other factors. The factors 1,3,5 and 6 have



<Figure 3> MICMAC Analysis

<Table 11> MICMAC Rank

| Factor | Driving power | Dependence | Driving power/dependence ratio | Mic mac rank |
|--------|---------------|------------|--------------------------------|--------------|
| F1 | 5 | 5 | 1 | 3 |
| F2 | 2 | 6 | 0.33 | 6 |
| F3 | 6 | 6 | 1 | 3 |
| F4 | 7 | 1 | 7 | 1 |
| F5 | 4 | 5 | 0.8 | 4 |
| F6 | 5 | 6 | 0.71 | 5 |
| F7 | 6 | 3 | 2 | 2 |

strong dependence and driving power. Thus reliability, responsiveness, information and ease of use establish a connection between dependence and independent factors. Factor 4 (website design) and 7 (personalisation) are the independent factors and are considered to be the key driving factors. Factor 2 (security) is ranked as sixth in the analysis. It has higher dependence on the other factors. This is because the changes in other factors could bring about changes in security.

V. Discussion and Conclusion

Following the literature survey and interaction with experts as well as the principal component analysis, the seven enablers of e-service utility and quality are identified, and validation has been done using a structured questionnaire. The seven enablers are reliability, responsiveness, security, website design, information, ease of use and personalization. The enablers are classified into four levels and it is further analysed using MICMAC analysis. The driver vs dependence power diagram initiated from the MICMAC analysis highlights the importance and interdependencies between these factors. The digraph provides an indication of the hierarchy of enablers and how they influence one another. From the digraph, it is clear that the website design is the primary level influencer. This reinforces the findings of MICMAC analysis which also establishes website design as the key enabler. Website design and personalization are found to be the independent enablers of the study. It has strong driving power and weak dependence. Thus, these two enablers are considered to be the crucial factors. This result is in congruence with the study by Rita et al. (2019) which has identified website design as one of the factors that affect e-serv-

ice quality in online shopping.

Both these factors have a direct relation with reliability and responsiveness. There are no factors in the autonomous region which implies that none of them are having weak driving power and dependence. Also, the factor security lies in the dependent region which means that it gets influenced by the other factors. Reliability, responsiveness, information and ease of use forms the linkage zone which indicates any action on these factors would influence other factors and also have a reverse effect on them. The result of this study authenticates the previous understanding which supports the findings of the study by Sundaram et al. (2017) stating that one of the service quality factors, responsiveness positively affects customer satisfaction in online purchases.

The findings of this study strongly reinforce the significance of website design and personalisation as crucial factors for e-commerce marketers to prioritize. The outcome of this study thus adds substantial weight to the previous studies which highlighted the paramount importance of these two factors. In the realm of online retail, where the future lies, these findings become even more critical.

The outcomes of the study prompted the authors to suggest the e-tailers to formulate strategies to make their website so exciting to entice prospective customers as well as to provide real consumers with an awesome experience, enjoyment and engagement. It is appropriate to comment that the website is inevitably the future place of business. Thus, utmost care and caution should be given while designing and deploying a website thus making it more interactive, engaging and creating a WOW factor for the users. Marketers should also contemplate and work on making a responsive website design rather than a place to garner information for those pre-qualified customers. A leading challenge to online marketers

is to tweak, tune and tailor-make the website in a constantly evolving digital world with a motto to enhance service quality. Moreover, the authors urge marketers to create a unique “flavour” for their website as part of personalisation providing an exhilarating user interface interaction like exchanging content, offering special rewards etc. Thus, by focusing on the key deciding attributes of website design and personalization, e-commerce marketers can create a better customer experience and phenomenal growth. Finally, it is a pertinent fact that since the majority of customers resort to mobile shopping, marketers have to be mindful to design a robust site to match the mobile screen sizes and functionality.

The covid pandemic has created and reinforced millions of consumers’ new online buying behaviours and habits. Traditional shopping styles got replaced by online grocery, apparel and entertainment shopping and the new trend will continue to sustain. Akin to this, retailers are also adapting to the omnichannel mode which blurs the line of traditional retailing. This emphasizes the necessity of an improved e-service utility as well as quality to ensure

customer patronage. The findings of this research paper have important implications for e-commerce retailers who are targeting Indian consumers. The study reaffirms that e-tailers can accomplish this by the convergence of two enablers namely website site design and personalisation.

5.1. Limitations and Future Research

One of the limitations of this study is that the empirical data solely focus on analysing the e-commerce within the grocery industry in the Indian context which may restrict the generalisability of the findings to a global scale. Thus, replicating this study in diverse industries and countries with a larger sample size would shed light on the significance of various service enablers in enhancing service quality within the specific domain. This study is restricted to selected variables as service quality enablers. Future research could explore the possibility of including new enablers for enriching the current understanding of the primary factors that contribute to improved e-commerce utility and service quality.

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<Appendix> Questionnaire

| Sl. No. | Elements |
|---------|--|
| 1 | Website is simple to handle |
| 2 | Information available on the website enables the purchase of products or avail of services |
| 3 | Website has a system to maintain safety during the exchange of user information |
| 4 | Website requests for personal information of user which are important for their activity |
| 5 | Performance of the website meets user's expectation |
| 6 | e -service provider is trustworthy and honest |
| 7 | Website attractively displays the information |
| 8 | Website provides regular updates on product or service |
| 9 | Purchasing from website will not cause financial risk |
| 10 | The website doesn't share user's personal information without their consent |
| 11 | The website knows their user well enough to offer them product and service according to their need |
| 12 | E-service or product provider fulfil their mentioned promises and commitment |
| 13 | Prompt service at the right time |
| 14 | Willingness to help |
| 15 | The staff handles the customer queries effectively |
| 16 | The website is visually attractive |
| 17 | The website presents information which is easy to understand |
| 18 | Electronic payment on the website is safe |
| 19 | The user feels safe while sharing personal information to website |
| 20 | Website has the essential resources to carry out its functions successfully |
| 21 | Provides with reliable technology system |
| 22 | Website informs the user when the service will be made |
| 23 | A website increases my search efficiency |
| 24 | Website delivers information which is easy to understand |
| 25 | Website has optimum technical efficiency to prevent user data modification by hackers |
| 26 | Website shows concern for the confidentiality of the users |

◆ About the Authors ◆



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Dr. Dhanya Manayath is an Assistant Professor (Senior Grade) in Amrita University, Kochi, India. She has graduated her Master of Science (M.Sc.) in Statistics and also holds a Master's degree in Business Administration (MBA). She obtained her UGC-NET in Management and M. Phil. in Statistics. She received her PhD degree in Statistics on the topic "Estimation of reliability measures of some heavy tailed life time distributions" from Mahatma Gandhi University, India. Her areas of interest include Statistical Inference, Stress Strength Reliability, Bayesian Estimation, Operations Research and Business Analytics. She has published research papers in reputed International journals.



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Dr. Dulari S S is an Associate Professor at SCMS School of Technology and Management having experience as an academician for more than a decade. She is awarded her Doctorate in management studies in the domain of Marketing. She has many publications to her credit. She has co-authored a chapter "Emerging Trends in Omni channel Retailing- A futuristic perspective" in the book Business Management Practices- Emerging Trends published in 2020. Notably, her academic pursuits are complemented by a rich year of corporate experience in a Public Limited company where she held a leadership role heading the marketing division. Her areas of specialisation span from Retail Marketing, Product and Brand Management to Counseling skills and Training and development for employees. She serves as a coveted resource person for the various Faculty Development programs (FDP) and Management Development programs (MDP) organised by the institution.

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