



A Survey of E-Commerce Integration in Supply Chain Management for Retail and Consumer Goods in Emerging Markets

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Abstract—As a game-changing technical development, e-commerce presents once-in-a-lifetime chances to improve the efficacy and efficiency of SCM. This research explores the influence of e-commerce on established business paradigms and how it integrates into supply chain management (SCM) for consumer products and retail in developing economies. Retail and consumer products merchants in Lusaka Province shared their main data, which shows that factors including perceived risk, efficiency expectation, effort expectancy, social influence, and enabling circumstances all play a role in e-commerce adoption. Performance expectation has a substantial positive connection with e-commerce adoption intentions ($R = 0.924$, R Square = 0.854). Advanced digital infrastructure and government backing are crucial to overcome infrastructural and market fragmentation, according to the report. The findings of this study may help stakeholders improve SCM processes via e-commerce integration to promote sustainable development and innovation in developing market economies.

Keywords—E-commerce, Supply chain management (SCM), Developing economies, Retail, Consumer products.

I. INTRODUCTION

The strategic relevance of digitalisation in logistics and SCM is growing as it challenges long-held assumptions, disrupts existing business models, and blurs the lines between different sectors [1]. The phrase "e-commerce" refers to a prevalent way of doing business whereby enterprises provide products and services to clients over the Internet, which can be accessed worldwide and at any time [2] [3][4]. More customers will be drawn to e-commerce businesses' products and services when these businesses enhance their online channels and reevaluate their marketing strategies [5] [6][7].

The past few years have seen a meteoric rise in a volume of online purchases made all over the world, thanks to the proliferation of both the Internet and related information technologies [8][9][10]. Considering the exponential growth of e-commerce marketing over a COVID-19 era, this is of paramount importance. A study by eMarketer predicts online sales in the United States (China) will have surpassed physical sales in terms of growth rate, reaching \$5.940 (\$6.123) trillion, up from \$4.894 (\$5.072) trillion in 2020. Both the business and academic communities are beginning to recognise the increasing significance of online commerce [11][12][13][14]. At the same time, due to the availability of management challenges that must be resolved, e-commerce is rapidly rising to the position of one of the most studied areas of company performance [15][16][17].

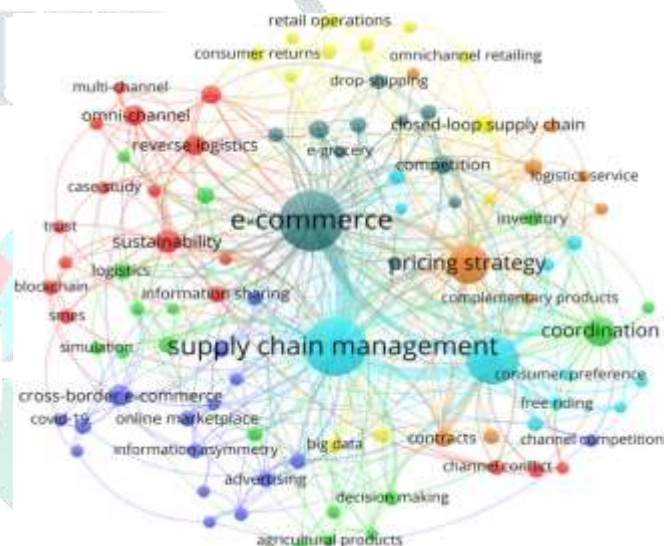


Fig. 1. Framework for E-Commerce SCM in Emerging Markets

Figure 1 illustrating factors affecting e-commerce integration in SCM for retail & consumer goods in emerging markets highlights several critical components. E-commerce serves as the primary sales channel, encompassing various operational activities. Logistics plays a pivotal role in facilitating order fulfilment and delivery, while efficient information sharing is essential for managing inventory and order status. Close coordination among stakeholders—retailers, wholesalers, logistics providers, and consumers—is crucial for seamless operations. Challenges in emerging markets include limited infrastructure, fragmented markets, and consumer preferences for cash-on-delivery. Successful integration hinges on government support, investment in logistics infrastructure, and the adoption of technology like warehouse and transportation management systems to enhance supply chain efficiency and visibility. Addressing these factors can foster a more integrated and efficient e-commerce supply chain beneficial for all stakeholders involved.

The growing importance of SCM in e-commerce studies and industry operations is a notable development in the field's history of study. SCM which focuses on how a company uses its own resources and how those resources are integrated with those of its external partners has been a popular area of study for academics and industry professionals for the past sixty years. [18][19]. The first studies in SCM were conducted in

the 1950s, to find ways to lower production costs and material procurement expenses for manufacturers and enterprises [20].

On a worldwide scale, the retail sector has been evolving and expanding. Despite the effects of COVID-19 on retail in 2020, The top 250 retailers in the world made an estimated 4.74 trillion USD in 2018, with about a quarter of it coming from their international operations, mostly in developing economies. Despite the market's continued fragmentation, organised retail has achieved remarkable strides in the last decade. While the economy was booming a decade ago, growth in recent years has been slower. Big CPI, currency volatility, big current account deficits, government indebtedness, and stringent FDI rules have all long been growth stumbling blocks for retail[21].

A. Motivation, significance and contribution

The rapid advancement of digitalisation and e-commerce has dramatically transformed logistics and supply chain management, challenging traditional business models and integrating diverse sectors. The substantial expansion of international e-commerce, particularly in developing nations where it creates novel possibilities and distinct obstacles, is the driving force behind this study. The present investigation brings attention to important factors by conducting a thorough examination of e-commerce cooperation within the SCM of retail and consumer goods sectors in these markets. The aim is to understand how these factors influence e-commerce adoption and to identify strategies that improve an efficiency and sustainability of supply chains, providing valuable insights for both academic research and practical applications in improving e-commerce-driven SCM in emerging markets. The following research contribution of this paper as:

- To examine an effect of performance expectancy on an adoption of e-commerce in supply chain management, providing insights into how perceived benefits influence behavioural intentions among retailers and consumers in emerging markets.
- To analyse the role of effort expectancy in e-commerce integration within supplychains, highlighting a challenges associated with perceived ease of use and its effect on an implementation of e-commerce platforms by retail and consumer goods companies.
- To evaluate an effect of social factors on e-commerce adoption in supply chain management, examining how social influence and peer pressure shape organisational strategies and consumer behaviour in the context of emerging markets.
- To assess the perceived risks associated with e-commerce adoption in SCM, identifying the potential barriers and trust issues that may hinder the seamless integration of e-commerce practices among stakeholders.
- To explore the facilitating conditions necessary for effective e-commerce integration in SCM, emphasising the importance of technological infrastructure, government support, and investment in logistics to enhance operational efficiency and visibility in emerging markets.

B. Organization of paper

This is how a remainder of the paper is structured. After introducing SCM in Section 2, the next sections review current practices in E-commerce within SCM, highlighting research gaps. The study methodology & results are detailed in 5th Section. Section 6 provides the comparative analysis and discussion evaluation of the regression model. Finally, we conclude and future work the paper in Section 7.

II. OVERVIEW OF SUPPLY CHAIN MANAGEMENT

A field of SCM has seen a "new" transformation in recent decades, defined by increased digitisation, purification, a focus on sustainability, and altered consumer habits and expectations[22]. An innovative idea in logistics, SCM, emerged in the late 20th century as a result of advances in both theory and practice; now, it is the most strongly connected commercial and economic industry in history. The increasing importance of customers, the globalisation of markets, and the fact that SCM is becoming more well-known all provide objective reasons for the expansion of the field. [23]. A wide variety of disciplines have contributed to the growth of SCM literature, including organisational theory, SCM, operations management, strategic management, marketing, logistics, and management information systems [24].

Efficiently managing the entire process, from product or service design all the way through to sale, consumption, and disposal by the customer, is what SCM is all about. Everything from brainstorming to sourcing to manufacturing to shipping to customer service and beyond is a part of this comprehensive process (see Fig. 2) [25].



Fig. 2. Supply Chain Management process

Supply chain integration is a cooperative strategy wherein companies and their supply chain partners work together to streamline and improve internal and external operational processes. The objective is to maximise value for consumers while minimising time and money spent by achieving optimal flows of products, services, information, and capital [26]. Both internal and external integration are possible in a supply chain. Table 1 contains the SCM Denotation.

Table 1: Denotation of Supply Chain Management

| References | Definition |
|---------------------|---|
| Singh et. al, [27] | SCM includes many different things, such as: transit, flow, storage, shelf-life, analysis of acquired commodities, and logistics for sales. Plan and execute specified SC procedures with the aid of SCM. In order to calculate a company's net worth, one must first ascertain a present state of the market for products and services, and then coordinate the supply and demand for these items. |
| Dias et. al, [28] | Coordination of material, information, and financial movements to satisfy customer requests and enhance overall SC competitiveness is what SCM is all about. |
| Martins et. al,[29] | The technique of planning, carrying out, & controlling SC activities to properly meet customer demands. From identifying raw materials to transporting finished items to customers, SCM is responsible for overseeing the whole manufacturing process. |
| Desai et. al, [30] | " SCM is "the process of integrating the critical business processes of a company from its customers into its core traders, who in turn offer value to its users & other investors through the provision of goods, services, and materials." |

III. LITERATURE REVIEW

In [31], e-commerce has always been a more dispersed sales channel in the global market, but its significance has grown and is expected to grow much more in light of a current COVID-19 pandemic situation. A study identifies main area

of study IT/data management. With each section comes a list of essentials, strategies, and measures for success. Before managers can put their e-commerce business into action or continue to grow it, a methodological framework is provided to summarize the analysis results.

In [32], Online marketplaces, or e-marketplaces, have emerged as a consequence of B2B, B2C, and C2C modalities brought about by e-commerce. According to the results, there is an emphasis on accounting, economics, the environment, and social responsibility as well as on energy, business, management, and the social sciences.

In [33], is to determine what the most important elements are that influence user behaviour and how those elements affect e-commerce customer satisfaction. Customers' perceptions of value are influenced in diverse ways by the satisfaction drivers mentioned and explained in the book. Given the subjective and ever-changing nature of this value, this research established a trustworthy method for evaluating factors related to online commerce. The findings may be used by online store marketers to determine the best way to streamline supply chains and improve order execution.

In [34], Suppliers of environmentally friendly items have responded to an increase of e-commerce and a greeneconomy by opening up online channels for direct consumer sales. The optimal choice of supply chain players in a Stackelberg game is investigated in this article by applying optimisation theory to the impacts of service spillover and various channel topologies.

In [35] Analyses a relationship between sustainable supply chain practices, digital transformation, and the implementation of blockchain technology to determine an impact on sustainable competitive advantage. A quantitative technique was employed to evaluate our model with 331 hotel and resort managers utilizing the resource-based perspective theory. The findings showed that BCT adoption modulates SSCS-SCA. They go into detail by stating that SSCP and DT

mitigate the associations among BCT adoption and SCA and SSCS and BCT adoption, respectively.

In [36], is to determine what variables primarily influence user behaviour and then analyse how these elements affect e-commerce customer happiness. Customers' perceptions of value are influenced in diverse ways by the satisfaction drivers mentioned and explained in the article. This study established a trustworthy method for evaluating e-commerce factors, which is important because this value is subjective and can change over time. To optimise supply chains and organise order execution, e-commerce marketers might use the generated findings.

In [37], examines the effects on long-term competitive advantage (SCA) of integrating blockchain technology with digital transformation and environmentally friendly supply chain strategies. Using the resource-based perspective theory, conducted a quantitative evaluation of our approach with 331 resort and hotel managers. According to the results, SSCS-SCA is modulated by BCT adoption. They go on to say that SSCP significantly moderates an association among an use of BCT and SCA, while DT significantly reduces the association between SSCS and BCT adoption.

In [38], article describes possible supply chain network hazards for Ghanaian firms and examines how SCRM techniques affect company performance. The research analysed data from 210 Ghanaian firms by modelling SCRM strategies, and company performance and assessing their complex linkages using a structural methodology. Ghanaian companies' performance was negatively correlated with supply chain risks.

The following table 1 provides the Summary of related work on E-commerce on Retail and Consumer Goods in Emerging Markets and supply chains.

Table 2: Summarization of related work on E-commerce on logistics and supply chain.

| Author | Focus of Study | Findings | Gaps | Limitations |
|---------------------|---|---|---|---|
| Zennaro et al. [31] | Impact of E-commerce on logistics and supply chain. | Identified five primary research topics: SCND, OL, RL, WR, IT, and data management. | Detailed implementation strategies and real-world case studies are missing. | The study focuses on theoretical aspects and may not reflect practical challenges fully. |
| Cano et al. [32] | Creation and impact of e-marketplaces. | Linked e-marketplaces, open innovation, and sustainability to economic, environmental, and social sustainability. Emphasized on B2B, B2C, and C2C modalities. | Need for research on traffic congestion, environmental effects, and user motivations. | Concentrates on broad trends, lacking specific actionable insights for individual businesses. |
| Ilieva et al. [33] | Determinants of user behaviour and customer satisfaction in e-commerce. | Developed a system for evaluating e-commerce factors affecting customer satisfaction using SEM. | Need for longitudinal studies to assess changes over time. | Relies on survey data, which may have biases and may not capture all variables. |
| Chen et al. [34] | Impact of online channels on the green supply chain. | Service spillovers beneficial for retailers; supplier encroachment affects service levels and emission reduction. | More empirical data needed to validate theoretical models. | Based on optimization theory, which may not capture real-world complexities. |
| Sarfraz et al. [35] | Effect of sustainable supply chain strategy on competitive advantage via blockchain and digital transformation. | Blockchain technology and digital transformation significantly moderate the relationship between SSCS and SCA. | Exploration needed on long-term impacts and industry-specific applications. | Focused on the hotel and resort industry, limiting generalizability. |
| [36] | Determinants of user behaviour and customer satisfaction in e-commerce. | Established a system for determining e-commerce factors affecting customer satisfaction using SEM. | Need for longitudinal studies to assess changes over time. | Relies on survey data, which may have biases and may not capture all variables. |
| [37] | A sustainable supply chain strategy's impact on digital transformation and blockchain's ability to boost competitive advantage. | Blockchain technology and digital transformation significantly moderate the relationship between SSCS and SCA. | Exploration needed on long-term impacts and industry-specific applications. | Focused on the hotel and resort industry, limiting generalizability. |
| Ganiyu et al. [38] | Supply chain risk management in Ghanaian firms. | Firms with structured SCRM perform better; supply chain risks negatively affect performance. | Need for cross-industry and cross-country comparisons. | Limited to Ghanaian firms, may not apply to different economic contexts. |

IV. RESEARCH GAPS

Despite substantial studies into many areas of e-commerce and its influence on logistics, SCM, and consumer behaviour, there is still a significant research vacuum in the integration of sustainable practices into e-commerce supply chains. While sustainability is widely seen as an important aspect of contemporary company strategy, there has been little empirical study into how e-commerce platforms may successfully embrace and execute sustainable supply chain methods. Existing research often focuses on theoretical frameworks or case studies rather than substantial empirical validation across several geographical locations and industries. Future studies might look at how e-commerce companies can handle difficulties, including environmental impact, ethical sourcing, and sustainable logistics while retaining a competitive edge and fulfilling customer expectations in a quickly changing digital economy. Addressing this gap will give significant information to academics and businesses looking to enhance the sustainability of e-commerce operations.

V. RESEARCH DESIGN AND ANALYSIS

The research methods, data collecting procedures, and analytic procedures that were utilised to accomplish the study's goals are described in this section. By offering an honest and systematic evaluation of the methodology, it aspires to provide a transparent roadmap for doing the study and provide a thorough and ethically sound answer to the research questions.

A. Data Collection

In a research work, gathering data is crucial as it establishes a foundation for further investigations. This study's primary data came from a structured 5-point Likert scale questionnaire. This survey targeted retail and consumer products dealers in Lusaka Province, Zambia, from a publicly available list of 1854 registered traders. The poll sought participants' views on SCM's e-commerce integration. Data collection was conducted with an eye toward ethical issues by informing subjects of the research's goals, that their participation was entirely voluntary, that their responses would be kept secret, & that they were free to extract by an investigation at any time. This method sought a full understanding of local retail e-commerce activities and attitudes [39].

B. Sample Size

The research employed simple random sampling and the Yamane technique to get the sample size with a 95% confidence interval. Yamane sampling formula eq 1 and 2:

$$n = \frac{N}{1 + N(e^2)} \dots \dots \dots (eq.2)$$

Where:

- E is the margin of error
- A sample size of n is considered optimal.
- The target population's quantity, denoted as N

$$n = \frac{1854}{1 + 1854 \times (0.05)^2} = 329 \dots \dots (eq.3)$$

The calculation utilized is based on simple random sampling, which implies that every individual has an equal likelihood of being selected. Surveys were halted when the sample size reached the cut-off point after being randomly administered to retail and consumer traders. Total response rate was 100%, and SPSS was used to evaluate the data. This quantitative study relies on SPSS, a software application that generates descriptive and inferential statistics.

C. Integrity of data

A scale's dependability, as measured by its internal consistency, is an indication of its freedom from random error. To determine the reliability of a scale, this research measured item correlation within the measure using Cronbach's alpha.

Since every single Cronbach's Alpha value is within a valid range of 0.70 to 0.80, we can say that the internal consistency is rather high. The dependability data for Cronbach's Alpha are summarised in Table 3[40].

Table 3: Dependability statistics. Foundation: (SPSS consistency statistics output)

| Cronbach's_Alpha | Cronbach's_Alpha Standardised Items-Based | No. of items |
|------------------|---|--------------|
| 0.712 | 0.759 | 17 |

In this below section, various different prospective of analysis of data has been explained.

D. Dataset Description

This research used Likert scale questionnaire answers from Lusaka Province retail and consumer items dealers. Each questionnaire reported quantitative data on e-commerce utilisation in SCM on a 5-point Likert scale by strongly agree to strongly disagree. Secondary data from Google Scholar, JSTOR, Emerald Insight, and Cochrane Library supplemented original data. These sources provided journal articles, government reports, and books on SCM-related e-commerce trends and practices. These databases provide for a deeper understanding of e-commerce adoption and its effects on retail operations in developing areas like Lusaka Province, Zambia.

E. Experimental Analysis

The following different analysing experimental methods are as follows:

1) Descriptive Statics

The gender breakdown of the sample shows that men made up about 59% of total and females around 41%. Table 4 provides a summary of the respondent demographics, which reveals that 50% of the sample fell within the 30-39 age range.

Table 4: Demographic profile. Source: (SPSS descriptive analysis output)

| Variable | Frequency | Percentage | Mean | Standard Deviation | Maximum |
|------------------------|-----------|------------|---------|--------------------|---------|
| Gender | | | | | |
| Male | 195 | 59.3 | | | |
| Female | 134 | 40.7 | | | |
| Total | 329 | 100 | 1.4 | 0.5 | 2 |
| Age Group | | | | | |
| 19-30 | 61 | 18.5 | | | |
| 30-39 | 164 | 49.8 | | | |
| 40-49 | 92 | 28 | | | |
| 50 above | 12 | 3.6 | | | |
| Total | 329 | 100 | 3.17 | 0.76 | 5 |
| Performance Expectancy | 329 | | 19.9757 | 0.15 | 20 |
| Effort Expectancy | 329 | | 19.9696 | 0.17 | 20 |
| Social Influence | 329 | | 19.9696 | 0.17 | 20 |
| Perceived Risk | 329 | | 14.9970 | 0.55 | 15 |

2) Normality Tests

The normalcy of the score distribution is assessed in this way. Normalcy is inferred from a non-significant result (Sig. > 0.05). A violation of the normalcy assumption is shown by the Sig. Value of 0.000 in this case. This is common for

samples with a total volume greater than 300. The Kolmogorov-Smirnov statistic is summarised in Table 5[41].

Table 5: Normality tests Source: (SPSS descriptive analysis output)

| Antecedents | Kolmogorov - Smirnov | |
|-------------------------|----------------------|-----|
| | Statistic | df |
| Effort Expectancy | 0.54 | 329 |
| Facilitating Conditions | 0.52 | 329 |
| Social Influence | 0.54 | 329 |
| Perceived Risk | 0.52 | 329 |
| Performance Expectancy | 0.54 | 329 |
| Behavioural Intention | 0.538 | 329 |

a) Performance Expectancy

A favourable correlation and a notable unique contribution are shown by multiple regression analysis between behavioural purpose to use e-commerce and performance expectation. Participants' intentions to engage in a behaviour tend to grow in tandem with their perceived degree of performance anticipation, according to this research.

Equation 4 of the Generic Model:

$$PE = \beta_1 \cdot U_1 + \beta_2 \cdot U_2 + \dots + \beta_n \cdot U_n + \epsilon_{PE} \dots \dots (4)$$

Where,

U_1 are user-specific factors and ϵ_{PE} Is the error term.

b) Effort Expectancy

The outcomes of the multiple regression analysis demonstrate that the two variables, effort expectation and behavioural intention for embracing e-commerce, are negatively related and that the former makes a substantial distinctive contribution. A participant's behavioural intention is inversely proportional to the total effort expectation, or the perceived effort required to accomplish a task.

Equation 5 of the general model:

$$EE = \beta_1 \cdot E_1 + \beta_2 \cdot E_2 + \dots + \beta_n \cdot E_n + \epsilon_{EE} \dots \dots (5)$$

Where, E_1 Are effort-related factors and ϵ_{EE} Is the error term.

c) Social Influence

The degree to which a distinct believes that the new method is utilised by prominent individuals. According to the findings, people's intentions to do something usually go down as their perception of the amount of social influence goes up.

$$SI = \beta_1 \cdot S_1 + \beta_2 \cdot S_2 + \dots + \beta_n \cdot S_n + \epsilon_{SI} \dots \dots (6)$$

Where:

S_1 Are social-related factors and ϵ_{SI} Is the error term, eq.6.

d) Perceived Risk

Problems that may arise as a result of utilising a service or system. According to the findings, people's intentions to do something usually go down as the perceived danger goes up. When people have faith in technology, their perception of danger decreases.

$$PR = \beta_1 \cdot R_1 + \beta_2 \cdot R_2 + \dots + \beta_n \cdot R_n + \epsilon_{SR} \dots (7)$$

Where:

R_1 are risk-related factors and ϵ_{SR} Is the error term, eq.7.

e) Facilitating Conditions

The extent to which a person thinks the present organizational and technical framework can support the system. The findings point to the need of creating a conducive environment for the adoption of e-commerce systems and suggest that SCM systems should benefit from more

infrastructure, training, and other forms of technical assistance in order to achieve their full potential.

$$FC = \beta_1 \cdot F_1 + \beta_2 \cdot F_2 + \dots + \beta_n \cdot F_n + \epsilon_{FC} \dots \dots (8)$$

Where,

F_1 are facilitating factors and ϵ_{FC} Is the error term eq.8.

3) Inference Statistics

Connectivity between two variables was described by correlation, which also indicated the strength of a relationship. According to the results shown by SPSS, the most important statistic is the Pearson's product-moment correlation (r). The possible values of the Pearson correlation coefficient (r) are -1 to +1. The dependent variable has a negative correlation with all five antecedents in this case. With r values of -0.488 for performance expectancy, -0.662 for effort expectancy, and -0.892 for social impact as antecedents, the variables show a substantial connection. A medium strength is shown by the correlation value of -0.35 for perceived risk, while a weak association is suggested by the value of -0.242 for enabling conditions.

VI. COMPARATIVE ANALYSIS AND DISCUSSION

An ANOVA. It is a way to compare the means of many groups using statistics. Here, the study compares and contrasts the results obtained by the analysis of ANOVA regression, residual, and output as shown in Table 6 below.

Table 6: Analysis output of ANOVA

| Model | Sum of Squares | degrees of freedom | Mean Square | F statistic | Significance |
|------------|----------------|--------------------|-------------|-------------|--------------|
| Regression | 6.66 | 5 | 1.33 | | |
| Residual | 1.14 | 323 | 0.004 | 378.77 | 00 |
| Total | 7.8 | 328 | | | |

The following parameters used are as described:

A. Sum of Squares

Regression analysis makes use of the sum of squares as a statistical measure to assess the dispersion of data points. Finding the function that fits the data the best with the fewest parameters is possible with its help.

The following is the formula (eq.9.) for the total sum of squares. For a set X of n items:

$$Sum\ of\ Squares = \sum_{i=0}^n (x_i - \bar{x})^2 \dots \dots (eq.9.)$$

Where:

x_i = The ith item in the set

\bar{x} = The average of every item in the group

$x_i - \bar{x}$ = Every item's variance from the mean

B. Degree of Freedom

In statistics, degrees of freedom abbreviated as DF is a value used in guessing the population variation or dispersion. Freedom degree is definite as the no. of values or quantities which can be freely assigned in a statistical model. In ANOVA it assists in defining the orientation of distribution of the test statistic. One common way to express dfB is as one minus the number of groups, while another way to express it is as the sum of all observed less the count of units. Between groups (dfB) degree of freedom is equal to the total number of groups minus one, multiplied by number of subjects in each eq. 10:

$$(dfB) = k - 1 \dots \dots eq.10.$$

Degrees of Freedom Within Groups (dfW), eq.11.:

$$(dfW) = N - k \dots \dots eq.11$$

C. Mean Square

Mean Square is essentially an average of the squared differences which is referred to often as the Sum of Squares and in relation to their already established application of degrees of freedom. When using analysis of variance (ANOVA), the MSW groups and MSB groups are determined by multiplying the number of squares within and among groups by their respective degrees of freedom.

Mean Square Between Groups (MSB), calculated as equ.12:

$$MSB = \frac{SSB}{dfB} \dots\dots\dots (12)$$

Mean Square Within Groups (MSW) is calculated as equ.13:

$$MSW = \frac{SSW}{dfW} \dots\dots\dots (13)$$

D. F Statistics

Using the F Statistic, a ratio of group variance to group variance, analysis of variance (ANOVA) analyses two datasets. Where MSB groups and MSW for the Mean Square inside each group, the formula is MSB/MSW. The degree to which the groups vary from one another may be determined by the size of the F statistic. F Statistic calculates as equ.14:

$$F = \frac{MSB}{MSW} \dots\dots\dots (14)$$

E. Significance level

The likelihood that the observed differences across groups happened by chance is indicated by Sig, which stands for significance level (also denoted as p-value). In ANOVA, a lower significance value (typically less than 0.05) suggests that a differences among group means are statistically significant, implying that a null hypothesis of no difference is rejected.

F. R- Square

The R-squared value is a statistical metric that indicates how well the independent variables in the model explain observed disparity in the dependent variable (R2). An ideal model-data fit is represented by a value of 1, and it may depend on values between 0 and 1 (eq.15).

$$R^2 = 1 - \frac{\text{Unexplained Variation}}{\text{Total Variation}} \dots\dots\dots (15)$$

1) R (Correlation Coefficient)

In statistics, the letter "R" represents a correlation coefficient, a numerical indicator of an existence and direction of a linear relationship among given variables. On a scale from -1 to 1, perfect non-linear connections are represented by 0, while ideal linear relationships are indicated by 1. R is determined using equation 16 for a basic linear regression:

$$R = \frac{Cov(X, Y)}{X\sigma Y\sigma} \dots\dots\dots (16)$$

2) R Square change

An additional independent variable modifies the regression model's coefficient of determination. It helps to assess the contribution of each additional variable to the model.

$$\Delta R^2 = R_{new}^2 - R_{old}^2$$

- R_{new}^2 Is a coefficient of determination after adding the new variable.
- R_{old}^2 Is a coefficient of determination before adding a new variable.

Table 7: Output of Model Summary Analysis

| Model | R | R Square | R Square Change |
|-------|-------|----------|-----------------|
| 1 | 0.924 | 0.854 | 0.854 |

The above-mentioned table 7 illustrates the results of a model summary study in three sections. The biggest section is 33%, which is labelled "0.854" R Square. The two smaller sections R and R Square change are labelled "0.854" and "0.924" with density of 32% 35% respectively.

VII. CONCLUSION AND FUTURE WORK

The impact of e-commerce on SCM in developing countries, particularly in the retail and consumer goods sectors, is illuminated by this research. The research highlights the significance of enabling environments, performance expectancy, perceived risk, social influence, and effort expectancy in determining organisational strategy and consumer behaviour. Looking ahead, future research could delve deeper into specific geographical contexts and industry verticals to validate these findings across diverse settings. Moreover, exploring the integration of sustainable practices into e-commerce supply chains presents a promising avenue for advancing both academic knowledge and practical applications. By addressing gaps in empirical research and leveraging technological advancements, future studies can contribute to enhancing the sustainability, efficiency, and flexibility of e-commerce-driven SCs in emerging markets.

REFERENCES

- [1] Y.-H. Li and J.-W. Huang, "Applying Theory of Perceived Risk and Technology Acceptance Model in the Online Shopping Channel," *World Acad. Sci. Eng. Technol.*, 2009.
- [2] R. Bandara, M. Fernando, and S. Akter, "Privacy concerns in E-commerce: A taxonomy and a future research agenda," *Electron. Mark.*, 2020, doi: 10.1007/s12525-019-00375-6.
- [3] S. Akter and S. F. Wamba, "Big data analytics in E-commerce: a systematic review and agenda for future research," *Electron. Mark.*, 2016, doi: 10.1007/s12525-016-0219-0.
- [4] K. Matsui, "Optimal bargaining timing of a wholesale price for a manufacturer with a retailer in a dual-channel supply chain," *Eur. J. Oper. Res.*, 2020, doi: 10.1016/j.ejor.2020.05.004.
- [5] T. Li, J. Xie, and X. Zhao, "Supplier encroachment in competitive supply chains," *Int. J. Prod. Econ.*, 2015, doi: 10.1016/j.ijpe.2015.03.023.
- [6] Y. Yan, R. Zhao, and Z. Liu, "Strategic introduction of the marketplace channel under spillovers from online to offline sales," *Eur. J. Oper. Res.*, 2018, doi: 10.1016/j.ejor.2017.11.011.
- [7] P. He, Y. He, and H. Xu, "Channel structure and pricing in a dual-channel closed-loop supply chain with government subsidy," *Int. J. Prod. Econ.*, 2019, doi: 10.1016/j.ijpe.2019.03.013.
- [8] Q. Lu and N. Liu, "Effects of e-commerce channel entry in a two-echelon supply chain: A comparative analysis of single- and dual-channel distribution systems," *Int. J. Prod. Econ.*, 2015, doi: 10.1016/j.ijpe.2015.03.001.
- [9] X. Wang, X. Wang, B. Yu, and S. Zhang, "A comparative study of entry mode options for E-commerce platforms and suppliers," *Electron. Commer. Res. Appl.*, 2019, doi: 10.1016/j.elerap.2019.100888.
- [10] J. Thomas, "Enhancing Supply Chain Resilience Through Cloud-Based SCM and Advanced Machine Learning: A Case Study of Logistics," *J. Emerg. Technol. Innov. Res.*, vol. 8, no. 9, 2021.
- [11] N. Yan, Y. Liu, X. Xu, and X. He, "Strategic dual-channel pricing games with e-retailer finance," *Eur. J. Oper. Res.*, 2020, doi: 10.1016/j.ejor.2019.10.046.
- [12] K. Patel, "Quality Assurance In The Age Of Data Analytics: Innovations And Challenges," *Int. J. Creat. Res. Thoughts*, vol. 9, no. 12, pp. f573-f578, 2021.
- [13] P. Agarwal, "The Impact of Technology on Supply Chain Management and Logistics: An Analytical Study," *Inf. Technol. Ind.*, 2018, doi: 10.17762/itii.v6i1.837.
- [14] V. Kumar, V. V. Kumar, N. Mishra, F. T. S. Chan, and B. Gnanasekar, "Warranty failure analysis in service supply Chain a multi-agent framework," in *SCMIS 2010 - Proceedings of 2010 8th International Conference on Supply Chain Management and Information Systems: Logistics Systems and Engineering*, 2010.
- [15] Z. Liu and Z. Li, "A blockchain-based framework of cross-border e-commerce supply chain," *Int. J. Inf. Manage.*, vol. 52, p. 102059, 2019, doi: 10.1016/j.ijinfomgt.2019.102059.
- [16] Y. Wang, R. Fan, L. Shen, and M. Jin, "Decisions and coordination of green e-commerce supply chain considering green manufacturer's fairness concerns," *Int. J. Prod. Res.*, 2020, doi: 10.1080/00207543.2020.1765040.
- [17] K. V. V. and S. G. Jubin Thomas , Piyush Patidar, "An analysis of predictive maintenance strategies in supply chain management," *Int. J. Sci. Res. Arch.*, vol. 06, no. 01, pp. 308-317, 2022, doi: DOI: https://doi.org/10.30574/ijrsra.2022.6.1.0144.
- [18] Y. Zhong, F. Guo, Z. Wang, and H. Tang, "Coordination Analysis of Revenue Sharing in E-Commerce Logistics Service Supply Chain With Cooperative Distribution," *SAGE Open*, 2019, doi: 10.1177/2158244019870536.

- [19] R. Tang and L. Yang, "Financing strategy in fresh product supply chains under e-commerce environment," *Electron. Commer. Res. Appl.*, 2020, doi: 10.1016/j.elerap.2019.100911.
- [20] M. Habib, "Supply Chain Management (SCM): Theory and Evolution," in *Supply Chain Management - Applications and Simulations*, 2011. doi: 10.5772/24573.
- [21] S. P. Deshmukh, P. D. Deshmukh, B. T. Patil, and G. T. Thampi, "Exploring the factors to make e-commerce and m-commerce ubiquitous and pervasive to improve national productivity of India," *Int. J. Product. Qual. Manag.*, 2019, doi: 10.1504/IJPM.2019.103691.
- [22] K. A. Mukhamedjanova, "Concept of supply chain management," *J. Crit. Rev.*, 2020, doi: 10.31838/jcr.07.02.139.
- [23] Q. Feng, G. Lai, and L. X. Lu, "Dynamic bargaining in a supply chain with asymmetric demand information," *Manage. Sci.*, 2015, doi: 10.1287/mnsc.2014.1938.
- [24] I. J. Chen and A. Paulraj, "Towards a theory of supply chain management: The constructs and measurements," *J. Oper. Manag.*, 2004, doi: 10.1016/j.jom.2003.12.007.
- [25] L. X. Lu and J. M. Swaminathan, "Supply Chain Management," *Int. Encycl. Soc. Behav. Sci. Second Ed.*, no. December 2015, pp. 709–713, 2015, doi: 10.1016/B978-0-08-097086-8.73032-7.
- [26] B. B. Flynn, B. Huo, and X. Zhao, "The impact of supply chain integration on performance: A contingency and configuration approach," *J. Oper. Manag.*, 2010, doi: 10.1016/j.jom.2009.06.001.
- [27] H. Singh, R. K. Garg, and A. Sachdeva, "Supply chain collaboration: A state-of-the-art literature review," *Uncertain Supply Chain Management*. 2018. doi: 10.5267/j.uscm.2017.8.002.
- [28] L. S. Dias and M. G. Ierapetritou, "From process control to supply chain management: An overview of integrated decision making strategies," *Comput. Chem. Eng.*, 2017, doi: 10.1016/j.compchemeng.2017.02.006.
- [29] C. L. Martins and M. V. Pato, "Supply chain sustainability: A tertiary literature review," *Journal of Cleaner Production*. 2019. doi: 10.1016/j.jclepro.2019.03.250.
- [30] A. Desai and S. Rai, "Knowledge Management for Downstream Supply Chain Management of Indian Public Sector Oil Companies," in *Procedia Computer Science*, 2016. doi: 10.1016/j.procs.2016.03.129.
- [31] I. Zennaro, S. Finco, M. Calzavara, and A. Persona, "Implementing E-Commerce from Logistic Perspective: Literature Review and Methodological Framework," *Sustain.*, 2022, doi: 10.3390/su14020911.
- [32] J. A. Cano, A. Londoño-Pineda, M. F. Castro, H. B. Paz, C. Rodas, and T. Arias, "A Bibliometric Analysis and Systematic Review on E-Marketplaces, Open Innovation, and Sustainability," *Sustainability (Switzerland)*. 2022. doi: 10.3390/su14095456.
- [33] G. Ilieva, T. Yankova, S. Klisarova, and Y. Dzhavarova, "Customer Satisfaction in e-Commerce during the COVID-19 Pandemic," *Systems*, 2022, doi: 10.3390/systems10060213.
- [34] X. Chen, J. Wang, P. Xu, T. Walker, and G. Yang, "Emission Reduction and Channel Decisions in a Two-Echelon Supply Chain Considering Service Spillovers," *Mathematics*, 2023, doi: 10.3390/math11214423.
- [35] M. Sarfraz, K. F. Khawaja, H. Han, A. Ariza-Montes, and J. M. Arjona-Fuentes, "Sustainable supply chain, digital transformation, and blockchain technology adoption in the tourism sector," *Humanit. Soc. Sci. Commun.*, 2023, doi: 10.1057/s41599-023-02051-9.
- [36] Y. T. Prasetyo and D. G. D. D. Fuente, "Determinant Factors Affecting Customer Satisfaction among Filipinos in Lazada Online Shopping during COVID-19 Pandemic: A Structural Equation Modeling Approach," in *2020 7th International Conference on Frontiers of Industrial Engineering, ICFIE 2020*, 2020. doi: 10.1109/ICFIE50845.2020.9266734.
- [37] V. Varriale, A. Cammarano, F. Michelino, and M. Caputo, "The unknown potential of blockchain for sustainable supply chains," *Sustain.*, 2020, doi: 10.3390/su12229400.
- [38] S. A. Ganiyu, D. Yu, C. Xu, and A. M. Providence, "The Impact of Supply Chain Risks and Supply Chain Risk Management Strategies on Enterprise Performance in Ghana," *Open J. Bus. Manag.*, 2020, doi: 10.4236/ojbm.2020.84095.
- [39] J. W. Creswell, "Educational research: Planning, conducting, and evaluating quantitative and qualitative research," *Educational Research*. 2012.
- [40] D. George and P. Mallery, *IBM SPSS Statistics 25 Step by Step*. 2018. doi: 10.4324/9781351033909.
- [41] R. Watson, "SPSS Survival Manual by Julie Pallant, Open University Press, Buckingham, 2001, 286 pages, £16.99, ISBN 0 335 20890 8.," *J. Adv. Nurs.*, vol. 36, no. 3, pp. 478–478, Nov. 2020, doi: 10.1046/j.1365-2648.2001.2027c.x.