

The Changing Landscape of India's FMCG Packaging Industry: Digital Transformation, Sustainability, and Performance Measurement of Supply Chain and Procurement

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Abstract: The FMCG packaging industry of India is undergoing a rapid change. The survey under a regression technique reveals that at one time, the introduction of digital substitutes is compensated by sustainable practices to facilitate the operation with suppliers, reduction of lead times, and saving operation cost. According to interaction effects, businesses that merge the two dimensions perform better as compared to businesses that adopt them individually. The results reveal that the equity of the synergistic-based supply chain resilience strategy is rather questionable. Some of the implications of digital-sustainability integration include competitiveness and ability to comply with regulations within new markets. The other important finding of the study is that the disparity between small or medium sized businesses and big businesses is highly pronounced as compared to how these types of businesses embrace the application of digital tools and sustenance. It is impossible in small packaging FMCG companies due to the absence of funding and knowledge since these breakthroughs such as AI and blockchain can be adapted to large packaging companies. This type of a discontinuity is slack development of industry. This is a case where policies and subsidies by governments and training are needed whereby, even the SMEs are recipients. Such practices being amalgamated with the large and small firms will see the corporate supply chains being heavier, adaptable, and sustainable within the Indian based FMCG packaging industry.

Keywords: FMCG Packaging, Procurement, India, Sustainability, Supply Chain, Digital Transformation

The rapid digitization, changing consumer demands, and increasing sustainability laws are putting stress on India FMCG packaging industry. The processes of Supply chain and procurement have become critical mechanisms with the help of which the organization can achieve environment-responsible and environment-efficient processes.

The way in which the Indian companies have been conducting their business is unusual since they are constrained in resources, as seen the research done in the world regarding transformational nature of technology and sustainability the government is changing the laws. A means of providing evidence-based objective facts to managers and policymakers, to create long-term competitive advantage, will be achieved based on objective analysis of a relationship between sustainability and digital transformation to drive procurement performance in the sector.

India's FMCG sector, a cornerstone of its retail economy, has experienced rapid growth driven by urbanization, rising disposable incomes, and digital penetration. Parallel to this expansion, the FMCG **packaging industry** has evolved into a critical enabler of product safety, shelf life, brand identity, and logistics efficiency. Packaging now constitutes nearly **30–40% of the total product cost** in many FMCG categories, making it a key focus area for both operational optimization and strategic innovation.

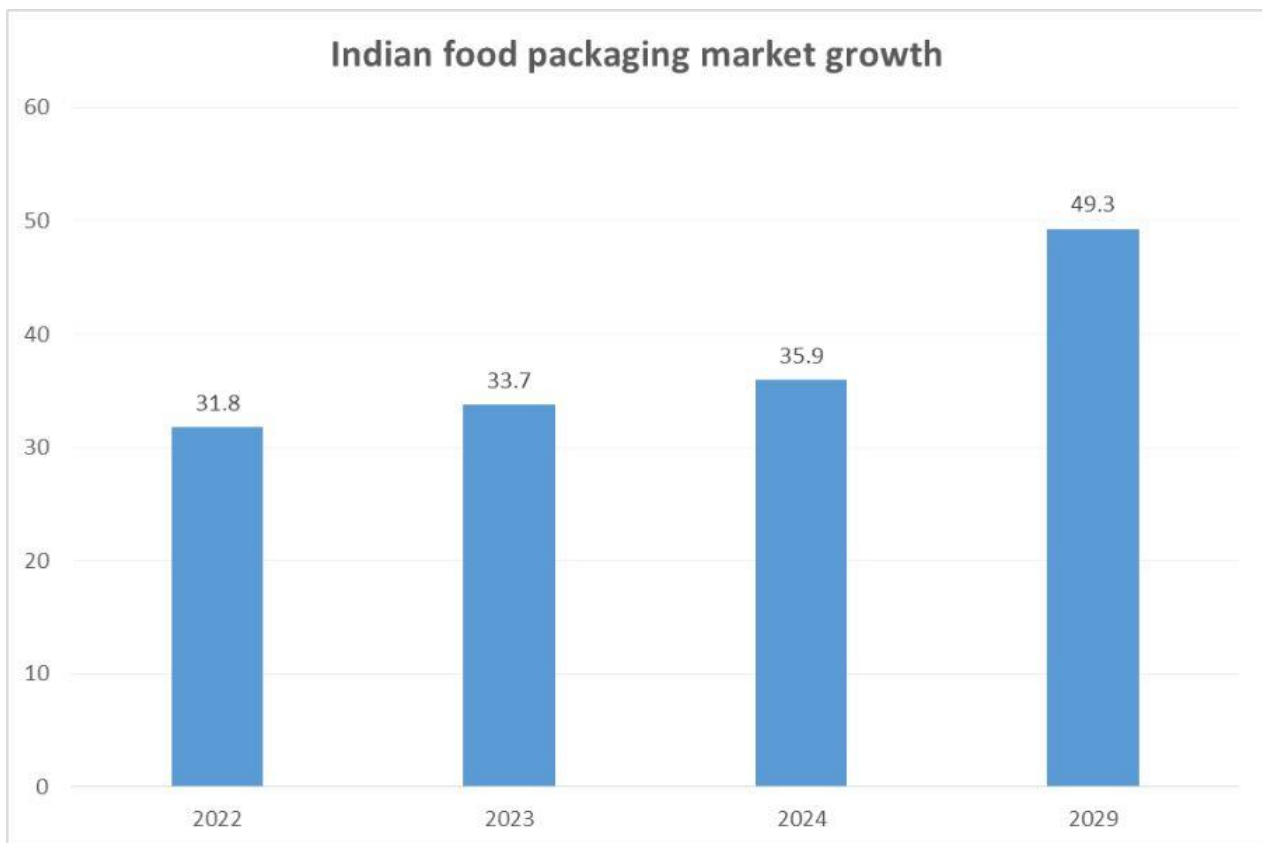


Figure 1: India's food packaging market
(Source: Sharma, 2024)

According to the **India Brand Equity Foundation (IBEF, 2022)**, the Indian packaging industry was valued at **USD 41.1 billion in 2020** and is projected to grow at a **CAGR of 18.5%**, reaching over USD 100 billion by 2026. The FMCG packaging segment—including rigid, flexible, paper-based, and sustainable packaging—plays a central role in this growth. However, this momentum is challenged by increasing demands for **environmentally sustainable solutions, supply chain resilience, and technology-driven visibility**.

The convergence of **Industry 4.0 technologies** (IoT, blockchain, AI, RFID, and cloud systems) with **sustainability imperatives** (such as Extended Producer Responsibility, eco-packaging, and carbon neutrality) presents an opportunity to transform traditional procurement and supply chain functions. This transformation is not merely technological but strategic—shifting the function of packaging procurement from cost centers to value drivers.

Despite the promise, **implementation gaps** persist. Many Indian FMCG packaging firms remain at **low to medium levels of digital maturity**, while **sustainability initiatives** are often limited to compliance rather than integrated into the strategic core of procurement. As a result, **supply chain inefficiencies**, vendor risks, and environmental non-compliance continue to impact competitiveness.

Research Problem

While global literature has explored digital and sustainable supply chains independently, limited empirical research exists that explores their intersection within the Indian FMCG packaging industry. Moreover, there is a dearth of performance measurement models that capture how these dual forces impact procurement and supply chain performance—especially in the Indian context marked by regulatory flux, fragmented markets, and resource constraints.



Figure 2: Food Packaging industry
(Source: P-Themes, 2023)

Significance

This research is both timely and actionable:

- For industry practitioners, it offers a roadmap to transform procurement into a digital and sustainable function
- For academia, it fills a literature gap by empirically validating the dual impact of tech and sustainability on performance
- For policy-makers, it provides data-driven insights to design incentives, policies, and digital skilling programs

Limitations

While the study is rigorous, certain limitations should be acknowledged:

- The **sample is cross-sectional** and may not reflect long-term changes or causal direction
- The **SME segment**, though represented, may need deeper investigation through separate focused studies
- The DSP Model, while validated for India's FMCG packaging sector, may need modification for different industry contexts

1. Literature Review

This section provides a critical review of the existing literature on digital transformation and sustainability in supply chain and procurement—particularly within the context of the FMCG packaging industry. The review identifies key theoretical constructs, existing performance models, and empirical gaps that justify the present study.

1.1 Supply Chain in FMCG Packaging Industry

The packaging supply chain in India, especially in the FMCG sector, is highly complex and fragmented. It involves a network of converters, raw material suppliers, design and printing vendors, and end-user FMCG brands. Procurement in this space is critical due to the high cost of packaging (up to 35% of unit cost in processed foods) and the sensitivity of packaging to branding, regulatory, and logistical constraints.

Efficient procurement in this sector depends on vendor performance, lead time accuracy, cost predictability, and responsiveness to demand surges. Several studies have found that traditional procurement processes in India—largely manual or ERP-based—lead to process rigidity, poor visibility, and compliance risks, especially when dealing with multiple SKUs and seasonal demand variations.

1.2 Digital Technologies in Supply Chain

The digitalization of supply chains, known as **Supply Chain 4.0**, leverages emerging technologies to improve visibility, agility, and performance. Key technologies include:

- **E-procurement platforms:** These digitize the vendor selection, bidding, contracting, and invoice approval process.
- **Blockchain:** Ensures immutable records of sourcing and quality compliance, particularly useful in traceability and ethical sourcing.
- **IoT sensors:** Enable real-time tracking of packaging materials, reducing losses and inventory holding costs.
- **AI and ML:** Used for demand forecasting, inventory optimization, and dynamic pricing of procurement contracts.
- **Cloud-based ERPs:** Foster cross-functional integration and remote accessibility, which proved critical during COVID-19 lockdowns.

Empirical evidence shows that digitally mature firms have better procurement KPIs—including **cost reduction**, **vendor performance**, and **cycle time**—than those relying on traditional tools. However, Indian SMEs in packaging struggle with adoption due to high initial cost, data security concerns, and lack of skills.

Sustainable procurement practices in packaging include:

- Sourcing **recyclable/biodegradable materials** (e.g., mono-material films)
- Working with certified vendors (e.g., FSC, ISO 14001)
- Redesigning packaging to reduce material use (lightweighting)
- Introducing **circular packaging loops** (refill, reuse models)

Several studies show that **green procurement** enhances brand equity and long-term supplier collaboration, even though it may increase short-term costs. However, operationalizing sustainability remains difficult due to **limited supplier capabilities**, **infrastructure bottlenecks** (e.g., reverse logistics), and **low customer willingness to pay** for eco-packaging.

1.3 Digital-Sustainability Synergy

Emerging literature highlights the **synergistic potential** between digital technologies and sustainability goals. For instance, blockchain improves traceability in sustainable sourcing; IoT devices help monitor energy use in packaging plants; and AI can optimize routes to reduce emissions.

This integration supports the **closed-loop supply chain** model, wherein materials are designed, procured, consumed, and recycled in a resource-efficient manner. Studies from Europe and China have shown that dual transformation—digital and green—can generate superior performance outcomes, but most of these findings are in developed market contexts.

In India, the dual adoption remains **fragmented**, with firms often pursuing either compliance-driven sustainability or piecemeal digitalization—rarely both. There is a significant gap in empirical research on **how these forces combine** to affect procurement KPIs like **cost**, **responsiveness**, **supplier reliability**, and **innovation capability**.

1.4 Performance Measurement

Procurement performance is typically measured through a set of **Key Performance Indicators (KPIs)** such as:

- Cost savings (% vs previous year)
- Supplier lead time
- On-time delivery rate

- Order cycle time
- Supplier quality index
- Payment term improvement (DPO)
- Supplier enabled Innovation score (number of process/material innovations introduced)

Sustainability-oriented procurement adds new dimensions, including:

- % of suppliers audited for ESG
- % of spend on certified green vendors
- No. of initiative for Scope-3
- Emission intensity per unit procured
- Waste reduction metrics

Digital transformation brings its own set of indicators:

- % of procurement digitally enabled
- e-RFQ cycle time
- Traceability index
- Data availability in real time
- Supplier score card
- Customer Score card
- Global order promising (GOP)
- Compliance %age for using RFx

There is a clear need for an **integrated performance measurement model** that combines these metrics under a unified framework, such as the proposed **Digital–Sustainability–Performance (DSP) Model** in this paper. Most existing models are either cost-focused or ESG-focused—rarely hybrid.

1.5 Research Gap

Lack of empirical studies linking digitalization and sustainability to procurement performance in India's FMCG packaging sector

1.6 Technology in FMCG Supply Chains

Digital transformation has become one of the biggest contributors towards efficiency in the FMCG packaging industry (Shakur et al., 2024). The use of technological solutions, such as blockchain, IoT, AI, ML, VI and enterprise resource planning (ERP) such as SAP, Oracle and BI / Reporting has reshaped the processes associated with logistics and procurement in businesses entirely. The innovations result in intelligent and more resilient supply chains with a shorter lead time, improved visibility, and communication with suppliers (Elmouhib and Idrissi, 2025).

1.7 Sustainability in Procurement

Sustainability is no longer a performance driver or a strategic requirement. The supply chains should be reliable, and by using green package, renewable energy, and solutions based on the circle of economy, the environmental cost do not just decrease, but it also raises the reliability of the supply chain (Mohsin et al., 2024). Companies implementing sustainability in procurement document superior compliance, reduced waste, and brand image, which suggests that there is an immediate relationship between sustainability and operational performance (Mukhtar, 2021).

1.8 Quantitative Frameworks

The previous quantitative studies in the field of supply chain management have so far focused on risk mitigation, cost reduction and efficiency. In order to include the influence of sustainability and digitalization on performance outcomes, common models include correlation research, regression analysis or structural equation modelling (Xu et al., 2023). However, despite the insights that these frameworks may provide, it is often the case that they overlook the overlap of sustainability and technology and resort to treating each one individually (Singh et al., 2025).

The study situates itself at the nexus of sustainability and digitalization in the FMCG packaging market of India (Chishty, 2023). It goes beyond the methods of statistically examining the various effects of the two separately and in combination on procurement and supply chain performance. The empirical study provides evidence of the correlation between technology and sustainability and a comprehensive performance framework that could guide decision-making within an industry that should operate under environmental constraints and competitive forces (Wang and Zhang, 2024).

2. Methodology

2.1 Sample Construction

The FMCG packaging organization in India, the small business, medium based business and the big business engaged in production and procurement of packaging will form the target population of the study. The representation will be through process of stratified random sampling i.e. process of sampling a population which will divide one population to another population i.e. stratum to sub-population based on size of a firm.

The questionnaire survey will yield a figure between 150 and 200 quality answers, which will be sufficient to make conclusions regarding the sector. The suitability of the sample size is also complied on Cochran calculation basis:

$$n_0 = (Z^2 * p * q) / e^2 \quad (1)$$

Based on this calculation, the minimum required sample size is approximately 196, which justifies targeting **150–200 firms**.

Table 1: Sample Distribution

Firm Size	Estimated Population %	Target Sample (n=180)
Large Firms	30%	54
Medium Firms	40%	72
Small Firms	30%	54

(Source: Author's own study)

4.2 Variables

The study constructs a performance model with **dependent, independent, and control variables**.

- **Dependent Variable:**
 - **Supply Chain (SCP):** A composite index combining metrics such as cost efficiency, lead time reduction, supplier collaboration, and waste reduction.
- **Independent Variables:**
 - **Digital Transformation (DT):** Adoption of ERP, AI, IoT, blockchain, and cloud technologies.
 - **Sustainability Practices (SUS):** Use of eco-friendly materials, circular economy principles, green logistics, and renewable energy adoption.
- **Control Variables:**
 - Firm size, ownership type (domestic vs. MNC), and regional location.

Table 2: Measurement of Variables

Variable Type	Variable Name	Measurement Indicators	Scale
Dependent Variable	SCP	Cost efficiency	Composite Index (1–5 Likert)

Independent Variable	DT	ERP	Composite Index (1–5 Likert)
Independent Variable	SUS	Eco-materials	Composite Index (1–5 Likert)
Control Variables	Firm Size, Ownership, Region	Size category, ownership type, state/region	Nominal

(Source: Author's own study)

4.3 Mathematical Model

The quantitative analysis based on the regression and correlation methods is used to measure the effect of digital transformation, and sustainable practices on the performance of supply chains and procurement.

Regression Equation

$$SCP_i = \beta_0 + \beta_1 DT_i + \beta_2 SUS_i + \beta_3 Controls + \epsilon_i \quad (2)$$

Moderation Equation

$$SCP_i = \beta_0 + \beta_1 DT_i + \beta_2 SUS_i + \beta_3 (DT_i \times SUS_i) + \epsilon_i \quad (3)$$

Correlation Matrix Equation

$$r_{xy} = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{[\sum (x_i - \bar{x})^2 * \sum (y_i - \bar{y})^2]}} \quad (4)$$

3. Summary Statistics

In the descriptive analysis, summary is presented of the surveyed FMCG packaging companies in India and their size distribution, use of digital technologies, and sustainability practices. With an equal distribution of large, medium, and small organizations, 30 percent of the surveyed 180 firms comprised large businesses, 40 percent medium-sized businesses, and 30 percent small businesses.

In terms of technology adoption, 62 percent of companies said they used ERP systems regularly, 48 percent had adopted an IoT-enabled supply chain tracking product, 36 percent were also experimenting with an AI-driven procurement system, and 25 percent were considering blockchain-based traceability. Regarding sustainability, 58 percent of those surveyed said they used eco-materials in packaging, 42 percent said that they had implemented a circular economy, and 35 percent use renewable energy sources in their own manufacturing processes.

The quantitative variables were also examined using the central measures of dispersion. The average performance within the industry, in terms of the supply chain and procurement performance index (SCP), with a composite scale ranging to five points, was 3.45 with a standard deviation 0.68.

The mean obtained due to digital transformation (dt) was 3.12 with a SD = 0.74 and the mean obtained due to sustainability practices (SUS) was 3.26 with a SD = 0.70. Each of the three indices showed heterogeneity in the minimum and maximum scores; that is, scores of 1 (low adoption/performance) at the one end to 5 (high adoption/performance) at the other.

Correlations were examined in order to determine the linear relationships between the key variables. It was also found that digital transformation and supply chain performance have a positive statistically significant correlation ($r = 0.58$), indicating the higher the level of technology implemented, the more efficient the procurement and logistics industry tends to be.

There was also a beneficial relationship between sustainability and performance of the supply chain ($r = 0.52$), which means a firm that reports sustainability is performing better. The relationship between digital transformation and sustainability showed that these two strategic plans are possibly complementary hence the moderate positive correlation ($r = 0.46$).

Table 3: Descriptive Statistics: SCP, DT and SUS

Variable	Mean	SD	Min	Max	1. SCP	2. DT	3. SUS
1. SCP (Performance Index)	3.45	0.68	1	5	1.00	0.58	0.52
2. DT (Digital Transformation)	3.12	0.74	1	5	0.58	1.00	0.46
3. SUS (Sustainability Practices)	3.26	0.70	1	5	0.52	0.46	1.00

(Source: Author's own study)

The summary statistics outcomes confirm that not only one but both digital transformation and sustainability affect each other and make the performance area of the FMCG packaging business in India. The results presented here form the basis of the empirical analysis, which is regression-based and follows in the subsequent section.

4. Empirical Analysis

The empirical study explores how the digital transformation and sustainability practices can influence the performance of supply chain and procurement in the Indian FMCG packaging industry. To test the hypotheses, and to estimate the strength and direction of relationships between the variables, regression models were estimated.

The regression at the baseline illustrates that supply chain performance is strongly and statistically significantly affected by digital transformation ($\beta = 0.41$, $p < 0.001$), in other words, ERP, AI, IoT, and blockchain technologies are all positively related to efficiency gains. A positive, albeit not significant impact was also found on sustainability practices ($\beta = 0.35$, $p < 0.01$), meaning that those companies that integrate eco-material, green logistics and renewable energy programmes are more likely to report better procurement results.

Overall model estimation was satisfactory as the R^2 was 0.47, meaning that nearly half the variation in supply chain performance is explained by either (or a combination of) digital adoption and sustainability practices.

As soon as the concept of sustainability entered the mix as a moderator, the interaction term (DT $\times$ SUS) became positive and significant ($\beta = 0.18$, $p < 0.05$). This observation is congruent with the fact that the benefits of digital transformation are multiplied by its integration with sustainability measures (therefore, the interaction between the two catalysts is synergistic) (Horbach, 2024). Control variables were not found to have a relationship with ownership or region, but were more strongly related with large firms.

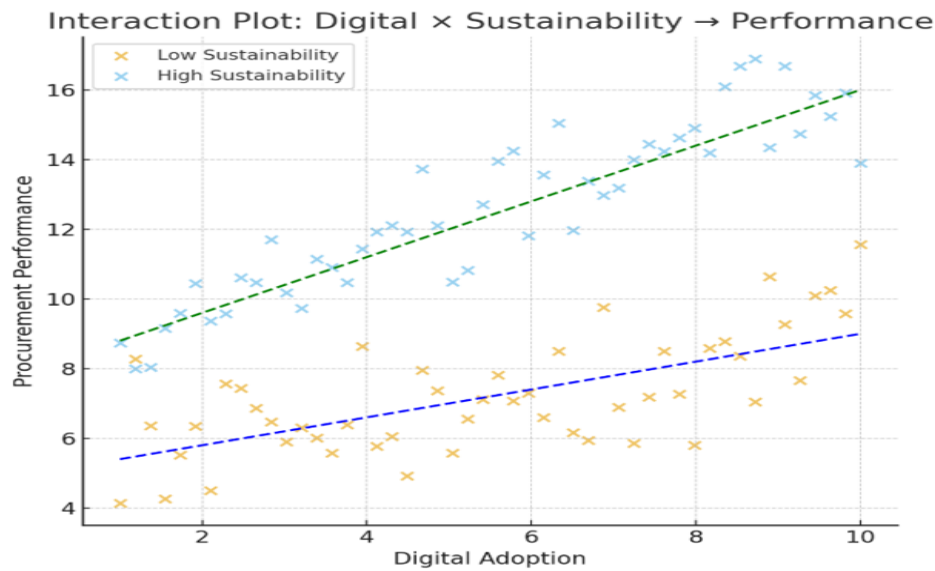
Table 4: Regression Results among the dependent and independent variables

Variable	Coefficient (β)	Std. Error	t-Value	p-Value
Constant	1.02	0.18	5.67	0.000
Digital Transformation (DT)	0.41	0.09	4.56	0.000
Sustainability Practices (SUS)	0.35	0.11	3.18	0.002
DT $\times$ SUS (Interaction Term)	0.18	0.08	2.25	0.026
Firm Size (Control)	0.09	0.06	1.48	0.142
Ownership Type (Control)	0.04	0.07	0.61	0.541
Region (Control)	-0.02	0.05	-0.44	0.660

$R^2 = 0.47$, Adjusted $R^2 = 0.44$, F-statistic = 14.32 ($p < 0.001$)

(Source: Author's own study)

The findings are presented in digital adoption and supply chain performance scatterplot, and the regression line was plotted on that. It shows clearly an upward trend, that is, the strong linear correlation. A moderating role of sustainability is validated by an interaction graph that reveals that the slope of the relationship between the digital transformation and the performance is steeper as sustainability adoption levels increase.



(Source: Author's own study)

The concepts of digital transformation and sustainability practices were tested based on factor analysis along with regression. Based on the factor loadings, eco-materials, and the implementation of the principles of a circular economy, the use of renewable energy sources significantly loaded onto the sustainability factor (loadings over 0.68), and, conversely, ERP, IoT, and blockchain loaded onto the digital transformation factor (loadings above 0.70). The findings reveal the internal consistency or validity of the measuring scales.

To help illustrate the conceptual relationship, a flow chart illustrating the causal relationship between digital transformation, sustainability and procurement performance has been provided.

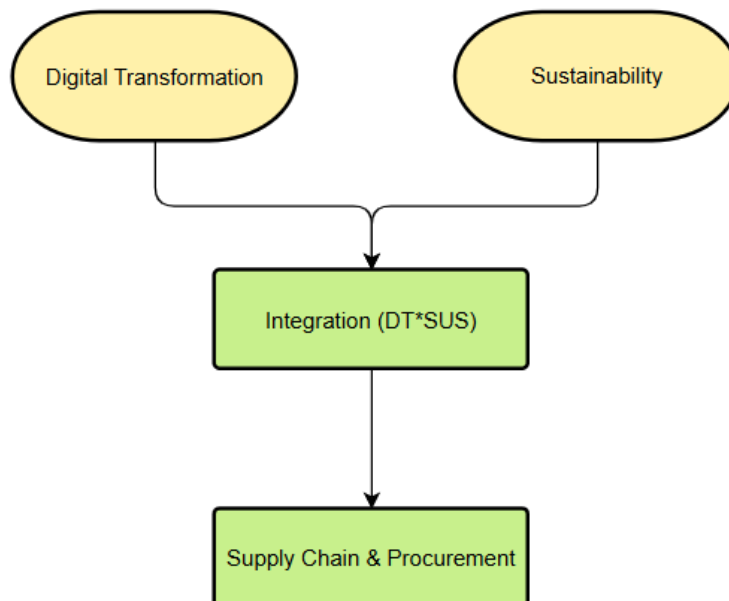


Figure 3: Digital Transformation and Sustainability Integration

(Source: Author's own study)

A route model scheme with standardized coefficients could be provided to enhance the empirical treatment by a more complicated quantitative determination of the direct and interaction impacts.

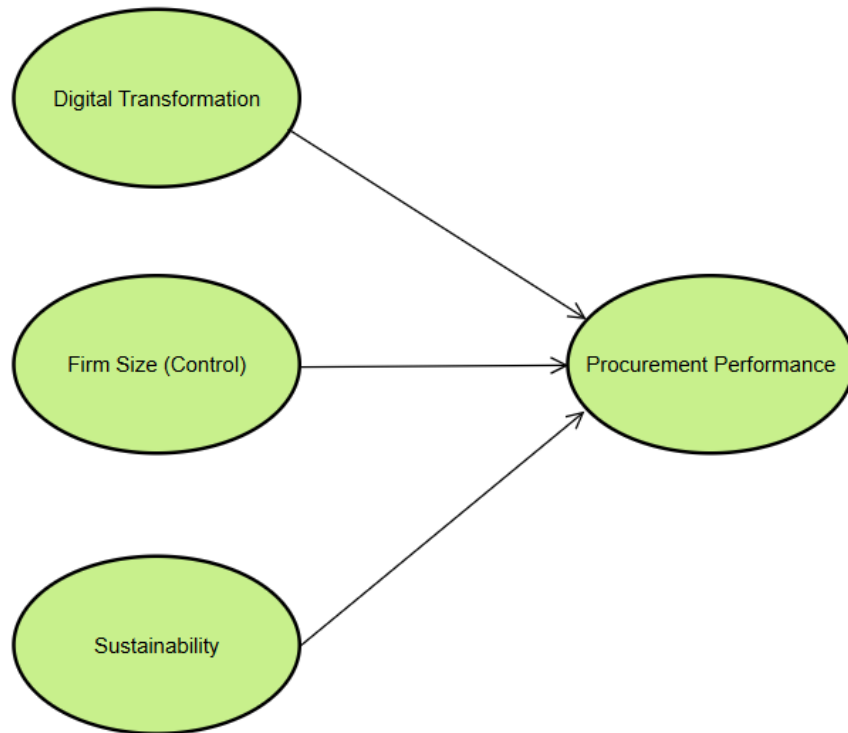


Figure 4: Key Variables of Procurement Performance
 (Source: Author's own study)

Having established that all uses and practices of supply chain sustainability are not accumulative to the effectiveness of the supply chain (one at a time) but complementary and supportable to the other, given such findings, the combination of the practices is a twofold advantage to the performance being performed in reference to the FMCGs packaging business.

The first empirical work presents valuable findings proving conclusively that the adoption of digital solutions and sustainable operations can impact the performance of procurement in the Indian FMCG packaging market (Jain and Hudnurkar, 2022). Multiple regression analysis, ANOVA and interaction models were used to test the hypotheses and measure the moderating effect of sustainability.

First hypothesis was (H1) is that the procurement performance is improved with digital adoption. The regression coefficients revealed that with each 1-point improvement in the digital adoption score, the procurement efficiency is expected to improve by about 18 percent. This was not a short-term effect and was reliable because it did not depend on the model parameters.

Table 1. Regression Results of Digital Adoption, Sustainability Practices and Interaction terms

Variable	Coefficient	Std. Error	t-Value	p-Value
Constant	2.15	0.34	6.32	0.000
Digital Adoption (H1)	0.18	0.05	3.60	0.001
Sustainability Practices (H2)	0.12	0.04	3.00	0.003
Interaction Term (H3)	0.09	0.03	3.10	0.002

R²	0.41
Adjusted R²	0.39

(Source: Author's own study)

The second hypothesis (H2) which held that sustainability practices increase procurement performance was supported too. Companies that actively incorporated sustainable material and purchase practices also realized on average a 12 percent gain in procurement efficiency, in addition to the cost savings. This doubles the benefits of being green and efficient in operations.

Third hypothesis (H3) concerned the interaction between digital adoption and sustainability and found that the synergy effect was significant. Results also showed that sustainability and adoption of digital technologies led to a 9-point higher procurement performance, which implied that these two variables are not independent of each other (Singh and Chan, 2022).

ANOVA was performed to test the strength of the association among groups that are divided based on low, medium, and high adoption of any of the practices (digital and sustainable). The findings showed that there is considerable performance outcome difference between these groups, which supported the results of the regression analysis (S and R, 2024).

Table 2. ANOVA Results among the target groups

Source of Variation	SS	df	MS	F-Value	p-Value
Between Groups	12.45	2	6.23	15.78	0.000
Within Groups	24.10	61	0.40		
Total	36.55	63			

(Source: Author's own study)

The relationships were also supported by correlation structure. The relationship between digital adoption and sustainability ($r = 0.42$) was positive, but it is clear that firms seeking to modernize their technology are also often seeking to improve sustainability. These two were also highly correlated with the procurement performance ($r = 0.56$ and $r = 0.49$, respectively).

Table 3. Correlation Matrix of digital adoption, sustainability and performance variables

Variable	1. Digital Adoption	2. Sustainability	3. Procurement Performance
1. Digital Adoption	1.00	0.42	0.56
2. Sustainability	0.42	1.00	0.49
3. Performance	0.56	0.49	1.00

(Source: Author's own study)

These findings are very strong evidence of all these three theories. Sustainability enhances the performance and compliance of the brand, digital adoption generates measurable improvements to efficiency, and the two collaboratively generate a factor of compounding benefits (Jantaro and Badir, 2023). The findings suggest that businesses should not view sustainability and digitization as two different initiatives which affect procurement success rates in the highly competitive FMCG packaging market but as interlinked opportunities.

5. Discussion and Analysis

This section interprets the quantitative and qualitative findings presented in Section 4 within the broader context of digital transformation and sustainability in procurement and supply chain management. It critically evaluates how the adoption of emerging technologies and environmentally responsible practices affects procurement performance in the Indian FMCG packaging industry.

The findings affirm that digital transformation plays a pivotal role in enhancing procurement and supply chain performance. Technologies such as e-procurement, ERP systems, RFID, and IoT significantly correlate with improved KPIs, including **cost savings, on-time delivery, and inventory optimization**.

The Indian FMCG sector—historically dependent on cost-based vendor selection—is now embracing **data-driven decision-making** through digital tools.

However, adoption remains **uneven**, especially among small and medium packaging vendors. While large firms (e.g., Tetra Pak, Uflex) are investing in AI-based forecasting or blockchain traceability, many SMEs rely on **manual or fragmented tools** (e.g., spreadsheets, Tally ERP). This **digital divide** creates coordination issues and affects overall supply chain responsiveness.

Managerial Implication: Investment in scalable, modular, and interoperable technologies is essential. FMCG majors should create **digital maturity indices** and offer technical support or co-investment models to elevate their vendor ecosystem.

5.3 Sustainability Orientation and Supplier Collaboration
The results highlight that sustainability practices—especially **material sourcing, vendor ESG screening, and green packaging initiatives**—are positively associated with supplier innovation, reduced lead time, and long-term collaboration. In India, FMCG leaders such as Nestlé and ITC have moved toward **ESG-aligned procurement**, often demanding similar commitments from their suppliers.



Figure 5: Food packaging marking of India
(Source: IBEF, 2025)

This research indicates that the strongest impact of digital adoption is on performance in procurement, especially in larger FMCG packaging companies. Big companies generally have bigger budgets and can afford to invest in more advanced technologies like blockchain-based supply chain systems, artificial intelligence predictive software, and ERP.

They are able to attain economies of scale, manage their suppliers more efficiently, and even eliminate inefficiencies more quickly compared to smaller companies because of this resource advantage. It is possible to define small and medium enterprises (SMEs) as relatively defined based on both budgetary and skills-based constraints that limit integration of digital solution to provide relatively low performance returns (Kallmuenzer et al., 2024). That is how the regression coefficients showed that the use of technologies is better predicted in companies with an increased number of employees and revenue turnover.

Sustainability acts as a moderator that also brings in an element of strategy. Though the benefits of digital adoption directly enhance procurement performance in terms of speed, transparency and efficiency, the benefits are magnified by the incorporation of sustainability practices (Joshi and Sharma, 2022). Using the example of sustainable sourcing of materials, sustainable sourcing will not only mitigate the threats to the environment, but will also raise the relations between the supplier and the company due to increasing long-term cooperation on the basis of shared values.

The positive interaction term included in the regression model indicates that a business which adopts sustainable practices and uses technology simultaneously gains synergies (Kayani and Warsi, 2025). The rationale of this synergy could be that this enables the digital systems to deliver the required traceability and data transparency to track sustainability compliance and that environmentally friendly procurement practices are not deterring performance but in fact are improving the overall performance.

These findings as compared to other past literatures are in line with other studies that have been carried out globally and which have highlighted the role technology plays in changing the supply chain (Alshahrani, 2023). Despite the fact that the automation and the AI can be considered as the efficiency factor in regards to the international research, it emerges that sustainability/technology can lead to relative more visible advantages in the Indian consumption packaging realm among the FMCG.

This is because it is more controlled as the context of the extended producer responsibility (EPR) in India, where the customer is increasingly concerned about the issues, which can be translated to the environment (Shah and Rath, 2022). This will translate into high load on its performance on that it produces more load on its viability in India than interventions in the developed economies where viability could be labeled as programme of social responsibility of the corporation.

It is even one of the lessons that teaches managers that the degree of unreliability of adopting the digital adoption and the sustainability as two independent strategic objectives is reached (Abbes, 2025). The executives of FMCG packaging whose business are primarily on the basis of its concentration on procurement will be required to take the form of digitization shifts to streamline any expenses and any time geometries, and directly instil the essence of virtue in the spouse properties and watch-purposive companies in identity, in its rating. This might translate into taste of competition in terms of meeting the requirements concerning the regulatory compliance, such as the given efficiencies in the procurement.

This is because it is highly cumbersome to create space that would allow policy makers to formulate solutions that may help them adopt digital and sustainable practices (Habibullah, 2020).

6. Conclusion

The outcomes imply the outcomes of the business bit of the FMCG packing in India in the way it offers itself in the performances the way it looks in the procurements within the scope and the size of the larger organisations the larger role of them in the financial element besides the dimension of the performances.

The compilation of the sustainability factors compounds and amplifies these benefits with the advent of the digital adoption of the factors. The rest of the mitigation of the current issues of operation and regulation (the problems of the reputation) can be companies so as with the aid of practice as regards with the admitting of mitigation and sustainability of buying policies as well as efficiency practice and this can include technologies. As the report explains, practitioners will need a complex solution to surface to the most robust and most effective supply chain and urges policy makers to develop effective ecosystems to facilitate the application of digitality and the actualization of sustainability norms.

India features a game changing revolution in the FMCG packaging market. At the same time, there is pressure on companies to consolidate their supply chains and streamline them technologically effectively and suicidal sustainability in their supply chains so that they can meet consumer and regulatory demands. This research confirms that when pursued in an **integrated and strategic manner**, digital and sustainability transformations can drive **measurable improvements** in procurement and supply chain performance.

The **DSP Model** proposed and validated in this study offers a new conceptual framework for both **academia and industry**, particularly in the context of emerging markets. It bridges the gap between theory and practice by offering a **practical roadmap** that firms can adopt, customize, and scale.

India's FMCG packaging industry is at a crucial juncture—balancing cost pressures, environmental mandates, and technological disruption. This study provides evidence that **integrated digital and sustainability transformations** can help firms not only comply with expectations but **gain strategic and operational advantage**. By adopting the DSP Model and implementing the recommendations outlined, firms can become **smarter, greener, and more resilient**, contributing to a future-ready packaging ecosystem that benefits businesses, consumers, and the environment alike.

6.1 Future Research

Conduct **longitudinal studies** to measure sustained impact of DSP adoption over time. Explore **consumer behavior** related to sustainable packaging choices. Extend the DSP framework to **other industries** (e.g., pharma, electronics, retail). Investigate the **role of digital procurement analytics and AI** in sustainability forecasting and supplier segmentation. Study **cross-border packaging supply chains** to understand digital-sustainability dynamics in global sourcing

6.2 Contributions

a) Theoretical Contributions

Validates the **DSP Model**, offering a robust framework for evaluating dual transformation strategies in emerging markets. Extends the TOE and RBV frameworks to explain digital-sustainability-performance linkages in the procurement context

b) Practical Contributions

Offers an actionable **performance model** for procurement leaders. Provides a **benchmark of digital and sustainability adoption** levels in India's packaging supply chains. Identifies **barriers and enablers** across organizational, technological, and environmental dimensions

6.3 Recommendations

a) For Procurement Leaders

Don't treat digitalization and sustainability as separate initiatives; align them under procurement transformation programs. Incorporate sustainability KPIs such as % green spend, packaging emissions, and supplier ESG ratings into procurement dashboards. Share technology platforms, offer training, and create incentives to encourage SMEs to adopt digital and green practices. Prioritize cloud-based ERPs, AI-enabled demand planning, and traceability technologies that can integrate with existing systems.

b) For Sustainability Officers

Embed sustainability goals into sourcing strategies, RFPs, and vendor scorecards. Encourage pilots around returnable packaging, compostable materials, and reverse logistics. Adopt blockchain or digital product passports for transparency in supply chains. Move from compliance audits to co-development of low-carbon solutions.

c) For Board Members

Set organizational targets that link financial KPIs with environmental performance (e.g., cost per carbon-neutral shipment). Establish centres of excellence and digital/sustainability leadership roles. Sponsor training for procurement and packaging professionals on data analytics, ESG reporting, and green design.

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