

Visibility Feature Effects ICT Based SCM Partners

Karthick. S¹, P. Sasikumar²

¹Research Scholar, School of Management Studies, Vels Institute of Science, Technology and Advanced Studies (VISTAS), Pallavaram, Chennai, Tamil Nadu, India-600117.

E-mail: karthickselvakumar@outlook.com (<https://orcid.org/0000-0001-6030-6376>)

² (Corresponding Author) Assistant Professor and Research Supervisor, School of Management Studies, Department of BBA, Vels Institute of Science, Technology and Advanced Studies (VISTAS), Pallavaram, Chennai, Tamil Nadu, India-600117.

E-mail: sasimba90@gmail.com (orcid id - <https://orcid.org/0000-0002-1585-4856>)

Abstract

The evolution of Information and Communication Technology (ICT) has revolutionized modern Supply Chain Management (SCM), enabling businesses to enhance connectivity, transparency, and responsiveness across supply chain partners. Among various technological dimensions, the specific ICT feature of visibility has emerged as a critical capability. This study investigates the impact of ICT feature visibility on supply chain efficiency—specifically measured through effectiveness and responsiveness. Employing a normative research survey design, data was collected through structured questionnaires distributed to employees in logistics companies operating in South Chennai. Furthermore, the research framework incorporates trust as a mediating variable and commitment as a moderating variable to acknowledge the critical role of relational dynamics in technological integration. Statistical analyses, including multiple regression and mediation-moderation models, were employed. The findings indicate that ICT visibility significantly reduces operational delays and enhances coordination, directly improving supply chain efficiency. Furthermore, trust successfully mediates this relationship, while relational commitment positively moderates the interaction between trust and operational outcomes. The study concludes that leveraging ICT visibility alongside strong collaborative partnerships provides organizations with a definitive competitive advantage.

Keywords— *ICT Feature Visibility, Supply Chain Efficiency, Logistics Performance, Trust, Commitment, Information and Communication Technology (ICT), Digital Supply Chain.*

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INTRODUCTION

Rapid technology advances and dynamic market forces have fundamentally altered existing business models, introducing a challenging environment characterized by Volatility, Uncertainty, Complexity, and Ambiguity (VUCA). To navigate this landscape, Information and Communication Technology (ICT) deployment across the supply chain has become a primary determinant of competitive advantage. ICT serves as the backbone of modern digital infrastructure, powering communication, automating tasks, and connecting systems. Within this digital transformation, the ICT feature of visibility plays a pivotal role. Visibility allows for real-time access to supply chain status, including inventory, shipments, and demand fluctuations. By shifting the focus from physical processes to information-based processes, organizations can reduce uncertainty and mitigate the bullwhip effect. Despite these advantages, information sharing can be hindered by systemic incompatibilities and confidentiality concerns among supply chain partners. Consequently, the success of ICT visibility is heavily dependent on inter-organizational trust and commitment. This study aims to design a holistic framework to measure how the specific ICT feature of visibility impacts overall supply chain efficiency,

factoring in the vital relational components of trust and commitment

I. LITERATURE REVIEW

a) ICT Feature Visibility and Supply Chain Efficiency

- Visibility is a core dimension of ICT that evaluates the ability of tools to provide real-time tracking, data access, and enhanced operational oversight across supply chain partners.
- High levels of visibility improve planning, forecasting, and supply chain agility.
- Sharing information transparently provides supply chains with a competitive advantage by enhancing trust-based relationships with customers and customs authorities.
- Supply chain management challenges often revolve around visibility; moving from opaque operations to a transparent level builds collaborative knowledge and shared abilities among end-users.

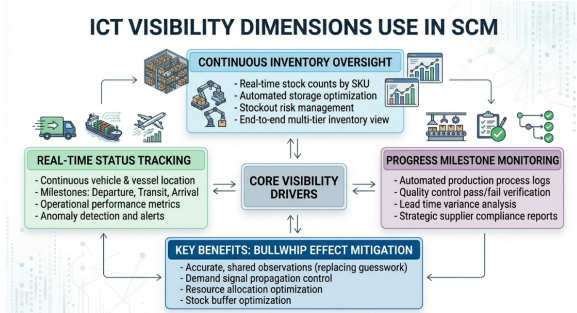


Figure 1 ICT Visibility dimensions use in SCM

b) Trust as a Mediating Factor

- The Trust is a multidimensional and intangible concept that acts as a main driver for supply chain partners, unpacking inter-organizational benevolence and credibility.
- Trust goes both ways; adopting technology makes trust both a consequent and antecedent variable toward supply chain partners.
- Trust mediates the relationship between ICT and supply chain efficiency, as ICT alone is insufficient unless partners trust the systems and each other.
- Higher trust levels improve information flow, reduce conflict, and increase the willingness of partners to coordinate closely.

c) Commitment and Performance Outcomes

- Commitment reflects the willingness of partners to invest in and maintain long-term relationships.
- Commitment moderates and strengthens the positive impact of ICT on supply chain outcomes.
- When commitment is high, ICT implementation and collaboration become significantly more effective.
- Conversely, when commitment is low, even highly reliable ICT systems may fail to achieve optimal results due to poor adoption or weak strategic alignment

II. METHODOLOGY

This study adopts a descriptive and explorative research design, specifically utilizing a normative research survey design through a structured questionnaire tool. The finite population for this study consists of all employees directly involved in supply chain management practices within logistics companies located in South Chennai. A stratified random sampling technique was deployed to ensure sufficient representation across various strata, including job roles, departments, and experience levels. The structured questionnaire captures responses on a five-point Likert scale to measure the perceived impact of ICT features on performance metrics.

Table 1 Variable Mapping Description Matrix

Variable	Type	Description
Visibility	Independent	The ability to monitor and access real-time

Variable	Type	Description
		operational information across the supply chain.
Trust	Mediator	Inter-organizational benevolence, credibility, and reliance on shared ICT platforms
Commitment	Moderator	Dedication to maintaining relationships and sustaining ICT integration success.
Supply Chain Efficiency	Dependent	Achieved through effectiveness (meeting goals) and responsiveness (quick adaptation to disruptions).

Regression Model

The relationships proposed in the conceptual framework were tested using the following models:

- ❖ $Trust = \beta_0 + \beta_1(Visibility) + \epsilon$
- ❖ $SC\ Efficiency = \beta_0 + \beta_1(Visibility) + \beta_2(Trust) + \epsilon$
- ❖ $SC\ Efficiency = \beta_0 + \beta_1(Trust) + \beta_2(Commitment) + \beta_3(Trust \times Commitment) + \epsilon$

III. OBJECTIVE

- ❖ To investigate the impact of the ICT feature of visibility on supply chain efficiency.
- ❖ To examine the mediating effect of trust among supply chain partners between ICT visibility and supply chain efficiency.
- ❖ To analyze the moderating effect of commitment among supply chain partners on the strength of the relationship between trust and supply chain efficiency.

IV. HYPOTHESIS

- ❖ **H1:** The ICT feature of visibility has a significant positive influence on supply chain efficiency.
- ❖ **H2:** Trust has a significant mediating effect between ICT visibility and supply chain efficiency.
- ❖ **H3:** Commitment has a significant moderating effect on the relationship between trust and supply chain efficiency.

V. FINDINGS

The data collected from supply chain professionals was analyzed using statistical tools including

descriptive statistics, correlation analysis, multiple regression, mediation, and moderation analysis.

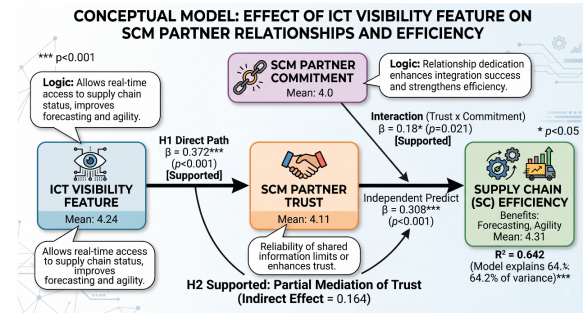


Figure 2 Conceptual Model: Visibility

Table 2 Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
ICT Visibility	4.24	0.62	2.8	5.0
Trust	4.11	0.67	3.0	5.0
Commitment	4.0	0.71	2.0	5.0
Supply Chain Efficiency	4.31	0.58	2.5	5.0
Logistics Performance	4.2	0.55	3.0	5.0

Table 3 Model Summary

Model Focus	R	R ²	Adjusted R ²	Std. Error of Estimate
Supply Chain Efficiency	0.801	0.642	0.637	0.35

Table 4 ANOVA Table (Model Fit)

Source	SS	df	MS	F	Sig.
Regression	18.20	4	4.55	37.24	0.000*
Residual	11.60	145	0.08		
Total	29.80	149			

The model explains 64.2% of the variance in supply chain efficiency ($R^2=0.642$). The model is statistically significant ($p<0.001$).

Table 5 Coefficients Table

Predictor	β	t-value	p-value
Visibility	0.372	5.81	<0.001
Trust	0.308	4.94	<0.001

Predictor	β	t-value	p-value
Commitment	0.226	3.89	0.001

Hypothesis Testing Results

- ❖ H1: Visibility -> SC Efficiency: The ICT feature of visibility demonstrates the strongest direct influence on supply chain efficiency ($\beta=0.372$, $p<0.001$). Visibility successfully allows real-time access to supply chain status, improving forecasting and agility. Hypothesis supported.
- ❖ H2: Trust as a Mediator: Trust partially mediates the relationship between ICT visibility and supply chain efficiency (Indirect Effect = 0.164). This validates that the adoption of technology limits or enhances trust based on the reliability of the information shared. Hypothesis supported.
- ❖ H3: Commitment as a Moderator: The interaction term (Trust $\times$ Commitment) is statistically significant ($\beta = 0.18$, $p=0.021$). Therefore, commitment strengthens the relationship between trust and supply chain efficiency, proving that relationship dedication enhances integration success. Hypothesis supported. Data Accuracy ($\beta = 0.30$, $p < 0.001$): The most influential predictor. Accurate, real-time data strongly improves coordination and performance across logistics operations.

INFERENCE

ICT plays a transformative role in enhancing supply chain performance through key features, with visibility standing out as a critical driver. The findings indicate that visibility by enabling real-time tracking, forecasting, and data access significantly mitigates operational delays and improves the responsiveness of the supply chain. However, the research explicitly demonstrates that technological features alone do not guarantee efficiency. The effectiveness of ICT visibility is heavily amplified by trust and reinforced by organizational commitment. Trust serves as the vital bridge; without inter-organizational credibility and benevolence, the information provided through ICT visibility will not be acted upon collaboratively. Furthermore, commitment ensures that these collaborative systems are sustained over the long term. Ultimately, a robust supply chain environment requires a synergy between digital transparency (visibility) and human-relational factors (trust and commitment) to translate technological investments into measurable improvements in both effectiveness and responsiveness.

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