Econimics

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A STUDY ON FACTORS AFFECTING SUPPLY CHAIN VISIBILITY

Summary. *Supply chain visibility plays a critical role in creating integrated values by ensuring a balance among economic, social, and environmental dimensions. Transparency is essential in building trust and collaboration among supply chain stakeholders and promoting responsible consumption. By increasing the use of accounting practices, it is possible not only to ensure financial reporting at every stage of the supply chain but also to enhance visibility by measuring and evaluating supply chain performance. Cost management is crucial for monitoring cost flows from raw materials to end users, optimizing resource utilization, and identifying risks and inefficiencies in the value chain.*

This article examines the factors that influence supply chain visibility and explores how accounting and cost management can contribute to improving transparency within the supply chain.

Key words: *cost accounting, supply chain management, supply chain visibility, linkage, supply chain relationship, green absorptive capacity, information sharing.*

Intorduction. Supply chain visibility is emerging as a key factor in enhancing the operational efficiency and strategic capabilities of modern organizations. By providing timely, accurate, and relevant access to information, visibility supports more effective decision-making and promotes the efficient allocation of resources. According to a study by Poleacovschi and Javernick-Will (2020), organizations that integrate visibility into their operations tend to exhibit more proactive thinking and enhanced flexibility in decision-making [7]. Improving internal capabilities for information sharing across all levels of an organization significantly enhances supply chain visibility [1]. Organizations that enhance supply chain visibility are better equipped to respond strategically to global economic challenges. However, the lack of real-time information often slows down the data collection process, resulting in delayed decision-making. High implementation costs, system complexity, and a lack of technical expertise further hinder the adoption of new technologies. These factors present significant challenges to improving supply chain visibility [13].

In recent years, the global food supply chain has faced numerous changes and challenges, and Mongolia is no exception to this trend [9]. For a food retail company, supply chain efficiency, visibility, and sustainability have become key factors in delivering quality products to consumers and achieving long-term business stability [11]. However, in the context of Mongolia, this supply chain remains dominated by traditional practices, with underdeveloped logistics, monitoring, and information-sharing infrastructure [23]. From local production

— the starting point of the supply chain — to the end consumer, the processes of verifying origin, ensuring quality control, and maintaining cost stability remain slow and poorly coordinated. This lack of integration poses a serious obstacle to achieving supply chain visibility [2]. During the COVID-19 pandemic, this fragile structure was fully exposed, revealing numerous issues such as food shortages, sharp price increases, and delivery disruptions [22]. This highlighted the urgent need to digitalize the supply chain and implement data-driven, optimized management practices [20].

Therefore, this study was conducted with the aim of assessing the current state of the supply chains of food retail companies in Mongolia, identifying the key challenges they face, and exploring opportunities to improve transparency and efficiency moving forward.

Literature review. Supply Chain, Supply Chain Management (SCM). Researchers La Londe and Masters (1996) defined the supply chain as a set of firms that pass materials along to one another [15]. This set may include organizations such as raw material suppliers, component manufacturers, product assemblers, wholesalers and retailers, as well as transportation companies [14]. Lambert, Stock, and Ellram (1998) also defined the supply chain as the network of interconnected businesses involved in the ultimate provision of product and service packages required by end customers.

Researchers Mentzer, DeWitt, and Min (2001) stated that a supply chain consists of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from the point of origin to the point of consumption [18]. The concept of supply chain management has evolved to encompass functions beyond logistics, recognizing a broader set of activities that span across multiple business organizations [6]. Organizations coordinate their activities with a primary focus on delivering unique, distinctive, or innovative value to customers. Langley and Holcomb (1992) stated that the main objective of the supply chain is to integrate

all supply chain activities to create customer value [17]. Some researchers view supply chain management as the process of managing relationships, information, and materials to create value for customers [14]. When these processes are effectively implemented, the supply chain becomes customer-focused, enabling the organization to generate unique value and operate efficiently [18]. Researchers suggest that by implementing supply chain management, organizational leaders can reduce costs, increase customer value and satisfaction, and ultimately gain a competitive advantage.

The Role of Cost Management in Enhancing Supply Chain Performance and Reducing Costs. The supply chain consists of three main components inbound logistics**,** core operations**,** and outbound logistics which together generate value from the initial investment [12]. By optimizing the value delivery chain to customers, organizations can achieve reduced costs, increased productivity, improved supply chain flexibility, shorter delivery times, higher profits, and greater customer loyalty [21]. Failure to focus on increasing supply chain efficiency can directly impact organizational performance [5]. Neely (2002) pointed out that this could lead to financial difficulties for the organization and eventually bankruptcy. Supply chain performance assessment creates a common understanding between stakeholders and enables them to work towards a common goal [8]. According to a 2017 study conducted by Geodis, a global transport and logistics services provider, 35% of supply chain professionals, senior executives, and directors identified "cost reduction" as one of the key performance indicators (KPIs) of supply chain performance. Cost reduction ranked second among the most recognized and utilized performance indicators in supply chain management. However, when optimizing supply chain costs, it is important to consider potential issues related to other processes. In other words, cost-cutting measures should be implemented in a way that does not negatively impact the organization's core operations [4]. Supply chain costs include all costs associated with network operations, such as demand forecasting, inventory management,

material handling, packaging, service support, location selection, purchasing, transportation, and warehousing [16].

Supply Chain Visibility. Supply Chain Visibility (SCV) refers to the ability to track, monitor, and understand goods, components, or raw materials at every stage of the supply chain — from the supplier through the manufacturer and distribution channels to the end customer [3]. This end-to-end visibility encompasses all stages of the supply chain, including raw material sourcing, production, warehousing, logistics, and final delivery [13].

According to Apeji and Sunmola (2022), maintaining visibility within the supply chain enhances trust, collaboration, and performance. Their study demonstrated that information transparency is a critical condition for supporting long-term collaboration and ethical accountability [1]. Enhancing the mechanisms of supply chain visibility strengthens an organization's adaptive capacity [10]. Such an impact highlights the strategic importance of supply chain visibility in building an organization's intellectual capital. Visibility is closely linked to supply chain agility, which is directly influenced by organizational discipline and internal coordination [22]. Organizations with supply chain visibility create a more integrated and agile environment by aligning their operations with shared goals and coordinating activities accordingly [19]. Researchers Funlade T. Sunmola and Uje D. Apeji consider supply chain visibility to be a fundamental element of a competitive supply chain [22]. Researchers are conducting studies to identify the factors that influence supply chain visibility and to assess the extent of their impact.

Factors Affecting Supply Chain Visibility. According to researcher Barratt, visibility should encompass information about both internal and external factors of companies within the supply chain [3]. Rojas and Zhang argue that the concept of visibility should encompass information related to regulatory and management approaches that enable stable supply during times of market uncertainty [4]. According to Zhang et al. (2011), visibility should be centered

around inventory management, whereas Marchet et al. (2012) argue that it should also encompass transportation within the supply chain. Funlade T. Sunmola and Uje D. Apeji (2024) introduced various approaches to enhancing supply chain visibility and emphasized the importance of considering the specific requirements of the manufacturing and business sectors when implementing these strategies. Specifically, they highlighted that information sharing, supply chain relationships, internal integration, and green absorptive capacity are key factors influencing supply chain visibility.

In a previous study, Uje D. Apeji and Funlade T. Sunmola (2022) identified fifteen critical factors that affect supply chain visibility and outlined their relevant characteristics. They demonstrated that these factors could be categorized based on four core dimensions: people, processes, technology, and environment.

Research Methodology. The study utilized the model and questionnaire developed by Sunmola and Apeji (2024) to assess supply chain visibility. According to their framework, external and internal linkages, supply chain relationships, green absorptive capacity, and information sharing are considered to influence supply chain visibility through interconnected pathways. The questionnaire consisted of the following components: External linkages – 4 items, Internal linkages – 4 items, Supply chain relationships – 3 items, Green absorptive capacity – 4 items, Information sharing – 3 items, Supply chain visibility – 3 items, Responses were collected using a 5-point Likert scale, and the data were analyzed using SPSS version 30.

Research results. The study was conducted to identify the factors influencing supply chain visibility within Company "A", which operates in the food import and retail sector. A random sampling method was used to collect survey responses from mid- to senior-level managers of the company. The survey was administered via Google Forms between November 10–14, 2024.

The demographic characteristics of the respondents, including age, gender, education level, and years of work experience are presented in the following table.

Table 1

General Information of the Respondents

Factor		Frequency	Percentage	Factor		Frequency	Percentage
Gender	Male	42	68.90	Work Experience	Up to 1 year	6	9.80
	Female	19	31.10		1-5 years	36	59.00
Age Group	18-20	1	1.60		6-10 years	18	29.50
	21-25	16	26.20		11-15 years	1	1.60
	26-30	26	42.60	Position	Sales and Marketing Department	7	11.50
	31-35	15	24.60		Internal Operations Department	41	67.20
	36-40	2	3.30		Finance Department	8	13.10
	46-с дээш	1	1.60		Human Resources Department	5	8.20

Source: compiled by the researchers

Based on the collected data, a total of 61 mid- to senior-level employees from Company "A" participated in the study. Of these respondents, 68.9% were female and 31.1% were male. In terms of age distribution: 26.2% were between 21–25 years old, 42.6% were between 26–30 years old, 24.6% were between 31–35 years old. This indicates that the company's workforce is predominantly composed of young professionals. Regarding departmental representation, a significant 67.2% of participants were from the Internal Operations Department, primarily consisting of branch-level managers responsible for specific units or departments.

Since the Kaiser-Meyer-Olkin (KMO) measure was 0.71 and Cronbach's Alpha was 0.7, the data was deemed reliable and suitable for factor analysis, allowing the study to proceed with further statistical examination. The results of the factor analysis are presented in the following table.

Table 2

Results of the Factor Analysis

Variables		Factor Loading	Eigenvalue	Variance	Cronbach's alpha
Linkage	EL1	.470	3.439	42.987	0.790
	EL2				
	EL3	.485			
	EL4	.651			
	IL1	.848			
	IL 2	.828			
	IL 3	.802			
	IL 4	.681			
KMO .757, Chi-Square 16.927, Cumulative % 42.987, Sig .000					
Green Absorptive Capacity	GAC1	.755	2.397	59.926	.774
	GAC 2	.821			
	GAC 3	.767			
	GAC 4	.752			
KMO .751, Chi-Square 62.261, Cumulative % 59.926, Sig .000					
Information Sharing	ISh1	.816	1.748	58.273	.626
	ISh2	.811			
	ISh3	.652			
KMO .614, Chi-Square 24.747, Cumulative % 58.273, Sig .00					
Supply Chain Relationship	SCR1	.562	1.448	48.258	.445
	SCR2	.727			
	SCR3	.777			
KMO .561, Chi-Square 9.125, Cumulative % 48.258, Sig .28					
Visibility	Vis1	.641	1.626	54.197	.814
	Vis2	.763			
	Vis3	.795			
KMO .602, Chi-Square 16.804, Cumulative % 54.197, Sig .001					

Source: compiled by the researchers

The factor analysis revealed that one variable, EL2 (an item under the external linkage construct), was removed from the model. This variable did not adequately load onto its respective factor, indicating that it was not a well-fitting

item for that group. Among the remaining items, the factor loading ranged from .470 to .848, suggesting acceptable to strong associations between the items and their corresponding constructs. The eigenvalues of the extracted factors ranged from 1.448 to 3.439, indicating that each retained factor explained a meaningful portion of the variance in the dataset. The variance explained across the identified factors ranged from 42.987% to 59.926%, demonstrating a reasonable level of explanatory power. To assess the internal consistency of the constructions, Cronbach's alpha values were calculated. These values ranged from .445 to .814. Three of the constructs met the generally accepted threshold of 0.7 for reliability: External linkage (α = .790), Green absorptive capacity (α = 0.774), Supply chain visibility (α = .814). These results indicate that the corresponding constructions are statistically reliable and appropriate for further analysis. However, other factors with lower alpha values (e.g., < 0.7) may require further refinement or revaluation in future research.

Table 3

Correlations

	Linkage	SCR	GAC	MX	Vis
Linkage	1				
SCR	.465**	1			
GAC	.619**	.384**	1		
ISh	.628**	.504**	.540**	1	
Vis	.509**	.313**	.492**	.587**	1
EL-External Linkage, IL-Internal Linkage, SCR-Supply Chain Relationship, GAC-Green Absorptive Capacity, ISh- Information Sharing, Vis- Visibility					

Source: compiled by the researchers

According to the results of the correlation analysis shown in the table, the correlation between all variables is statistically significant. This is evidenced by the fact that the Pearson correlation coefficients are positive, and all p-values are less than 0.05, indicating a strong statistical association among the variables.

Therefore, it can be concluded that each variable included in the study is interrelated and contributes either directly or indirectly to supply chain visibility.

Table 4

Multiple Regression Analysis – 1 (Coefficients)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.741	.390		1.900	.062
	Linkage	.387	.127	.390	3.054	.003
	SCR	.236	.112	.232	2.106	.040
	GAC	.175	.098	.216	1.786	.079
a. Dependent Variable: ISh- Information Sharing						

Source: compiled by the researchers

In the regression analysis, the variable "linkage" has the strongest and statistically significant influence on the dependent variable "information sharing" (Beta = .390, Sig. = .003). The variable "supply chain relationship" also shows a statistically significant effect (Beta = .232, Sig. = .040). Meanwhile, the variable "green absorptive capacity" has a positive influence (Beta = .216), but it is not statistically significant (Sig. = .079). Based on these findings, it can be concluded that "linkage" and "supply chain relationship" are the dominant factors influencing information sharing within the supply chain.

Table 5

Multiple Regression Analysis – 2 (Coefficients)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.099	.410		2.681	.009
	ISh	.652	.117	.587	5.575	.000
a. Dependent Variable: Vis- Visibility						

Source: compiled by the researchers

Information sharing (IS) has a strong and positive effect on supply chain visibility (SCV), with a standardized coefficient of Beta = 0.587 and a

significance level of Sig. = 0.000. This indicates that a one-unit increase in IS leads to a 0.652-unit increase in SCV. The relationship is highly statistically significant ($p < 0.001$). Therefore, IS is confirmed to be a key explanatory variable in driving improvements in supply chain visibility.

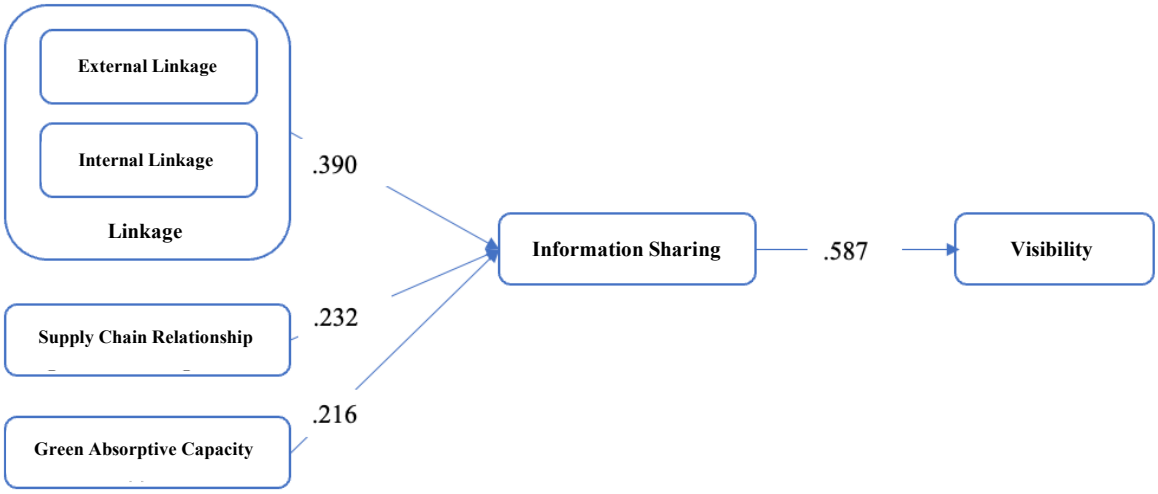

Fig. 1. Structural Model

Source: compiled by the researchers

The findings of the study reveal that information sharing plays a central role in enhancing supply chain visibility within organizations. When organizations can effectively share relevant and timely information across both internal and external levels, it significantly contributes to greater transparency throughout all stages of the supply chain. The analysis also confirmed that strengthening both external and internal linkages within the organization has a positive impact on information sharing practices.

Moreover, the quality and coordination of supply chain relationships serve as a foundational element that fosters open communication and collaborative decision-making. In addition, the organization's ability to absorb and integrate environmentally relevant information, referred to as green absorptive capacity, was also found to positively influence the level and effectiveness of information sharing.

Taken together, the results suggest that multiple interconnected factors, including information sharing, strong linkages, relational alignment, and environmental responsiveness—collectively influence the level of supply chain visibility. Enhancing these factors is therefore essential for organizations seeking to build a transparent, resilient, and strategically agile supply chain.

Results. This study systematically examined the key factors influencing supply chain visibility, focusing on the interrelationships among organizational external and internal linkages, information sharing practices, green absorptive capacity, and supply chain relationships. The findings confirm that information sharing is the most influential and statistically significant factor affecting supply chain visibility. Furthermore, external and internal linkages, along with supply chain relationships, were found to have a substantial impact on enhancing information sharing within organizations.

While green absorptive capacity also showed a positive influence on information sharing, its statistical significance was relatively weaker. This suggests that environmentally responsible practices have not yet been fully integrated into information-sharing processes across supply chain stages. Therefore, in order to improve visibility, it is crucial for organizations to cultivate a culture of open information sharing, strengthen information flows, and optimize their internal coordination mechanisms.

One essential dimension of information sharing involves financial data. Accumulating cost data at each stage of the supply chain enables organizations to apply cost accounting and cost management approaches for more informed pricing decisions. Such practices support strategies aimed at cost reduction and profit maximization based on the principle of aligning with target profitability. Consequently, the integration of financial transparency into information-sharing practices offers significant opportunities to enhance both supply chain efficiency and strategic decision-making.

Discussion. One of the most effective strategies for enhancing supply chain visibility is the implementation of robust information-sharing mechanisms across all levels of the supply chain. Ensuring real-time access to operational data enables more responsive and informed decision-making. To this end, strengthening collaboration among supply chain actors—as well as between departments and personnel within an organization—is essential for improving the flow of information and operational alignment.

Establishing stable, trust-based relationships with suppliers, distributors, and customers can further improve strategic coordination across the entire supply chain. Moreover, the ability to quantify costs and assess resource utilization at each stage of the supply chain enhances transparency, monitoring capacity, and the quality of financial reporting. This, in turn, supports the optimal allocation of resources and encourages responsible consumption within organizations.

By investing in integrated information systems, cultivating inter-organizational trust, and aligning cost management practices with strategic goals, organizations can significantly strengthen their supply chain visibility and long-term resilience.

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