Supply Chain Performance: Material Flow and Financial Flow Through Supplier Relationship Management

Pudjo Sugito*, Ririn Sudarwati

Faculty of Economics and Business, University of Merdeka Malang

Article History:
Received: 2025-11-15
Revised: 2025-12-25
Accepted: 2025-01-27
Publish: 2026-01-31

Corresponding Author:
Pudjo Sugito

E-mail:
sugito@unmer.ac.id

Keywords:
Financial Flow, Material Flow, Supply Chain, Supplier Relationship Management.

Abstract

This study aims to analyze the direct influence of material flow and financial flow on supply chain performance, and also analyze the indirect influence through supplier relationship management on supply chain performance. This research is explorative with survey technique as data collection tool. Exogenous variables in this study are material flow and financial flow, endogenous variables are supply chain management performance and supplier relationship management as mediating variables. Material flow is the description of the transportation of raw materials, pre-fabricates, parts, components, integrated objects and final products as a flow of entities. The term applies mainly to advanced modeling of supply chain management. The indicators are inventory quantity, lead time and out of stock. The population in this study was 124 business actors with a sample of 100 business actors. The sampling technique used simple random sampling. Questionnaires as primary data collection tools, which were then analyzed with the help of Smart Partial Least Square. The results of the analysis show that there is a direct and significant influence of material and financial flow on supply chain management performance. In fact, supplier relationship management significantly mediates the influence of material flow and financial flow on supply chain management performance. Also, supplier relationship management has a significant influence on supply chain management performance. This means that both material flow, financial flow and supplier relationship management play an important role in improving supply chain management performance.

INTRODUCTION

A supply chain is a network of individuals and companies who are involved in creating a product and delivering it to the consumer. Links on the chain begin with the producers of the raw materials and end when the van delivers the finished product to the end user. Supply chain management is a crucial process because an optimized supply chain results in lower costs and a more efficient production cycle. Companies seek to improve their supply chains so they can reduce their costs and remain competitive.

In the dynamics of global market competition lately, the introduction of products with increasingly shorter life cycles, and increasingly high customer expectations for products and services, will certainly force companies to invest and focus on the supply chain to achieve competitive advantage in order to support the continuity of their business (Kaewchur et al., 2020; Sule & Oshi, 2022). At the same time, transportation and communication technology continues to develop rapidly, for example mobile communication, the internet, has driven the ongoing evolution of the supply chain and techniques related to its management.

In a real product chain, raw materials are obtained and produced in processing facilities, then sent to storage warehouses and then sent to customers or retailers. Consequently, to reduce prices and improve service quality, effective supply chain strategies must consider interactions at various levels in the supply chain that occur (Idris et al., 2023). The supply chain is also known as a logistics network, consisting of suppliers, manufacturing or manufacturing centers, warehouses, distribution centers, and retail stores, as well as raw materials, semi-finished goods, and finished products. Supply chain management carefully considers each facility that has a significant impact and plays a role in making products to be able to adjust to customer needs. Of course, in some supply chain analyses, including suppliers and customers because they have an impact and are related to the achievement of the supply chain. Measurement of supply chain management performance needs to be done. This is because high performance optimizes costs from the entire system which includes transportation and distribution costs to raw material centers, semi-finished goods in the processing process, and finished goods. The meaning of cost suppression is not merely an effort to reduce transportation costs or reduce existing inventory, but an effort to develop through a comprehensive system approach to provide materials to products supported by adequate information technology in the entire existing supply chain. Of course, it is the target of every business entity. However, to achieve it, hard work is needed by all levels of management from the bottom to the top. This means that a high spirit of collaboration is needed by releasing partial interests in each section (Zhong et al., 2022). Not only that, to realize this good performance, business entities must also be managed in an integrative manner, with a greater orientation towards achieving long-term goals than short-term goals (Partyka, 2022). Clearly, making material flow and information flow as mediators of supply chain performance is something new in this research, namely a new approach that has never

been done in previous research. That's why, the aims of this research is to analyze and create a new model of supply chain management performance.

LITERATURE REVIEW

Resource-Based View (RBV) suggests that sustainable competitive advantage comes from resources within the supply chain (Barney, 2007). That is due to he Resource-Based View (RBV) approach has become a key conceptual framework in strategic and operational management, emphasizing the importance of both internal and external resources in creating competitive advantage. The application of the RBV in the context of operational management, focusing on the identification, management, and optimization of valuable, rare, inimitable, and non-substitutable resources. Through literature analysis and case studies, the RBV approach helps companies design efficient and innovative operational processes, increase productivity, and create sustainable added value. Meantime, supply chain performance refers to the extended activities in meeting and customer requirement including product availability, on time delivery and all necessary inventory to deliver performance in a responsive manner (Chopra, et al. 2024).

Further, the role of material flow is very important in realizing supply chain management performance. This is because the smoothness of material has benefits on the efficiency of transportation costs and inventory costs which are often relatively large in almost every manufacturing entity. Research on the importance of material flow management has been revealed in several studies which state that inventory management systems can improve supply chain management performance (Oteki & Sakwa, 2020; Al Kurdi et al, 2022). Financial flow as another factor in determining supply chain management performance also has a significant effect on improving performance (Komal, et al, 2022). In addition, the role of suppliers is very important considering that without suppliers the company will not be able to carry out its production activities. Therefore, supplier relationship management is very important in order to ensure the smooth supply of materials, especially raw materials as the main input for the manufacturing entity. So it is not surprising that many studies have found a close relationship between supplier relationship management and supply chain management performance (Azis et al, 2023).

Based on the research objectives, several previous studies and the formulation of hypotheses that have been described, the conceptual framework for the research is. Follows:

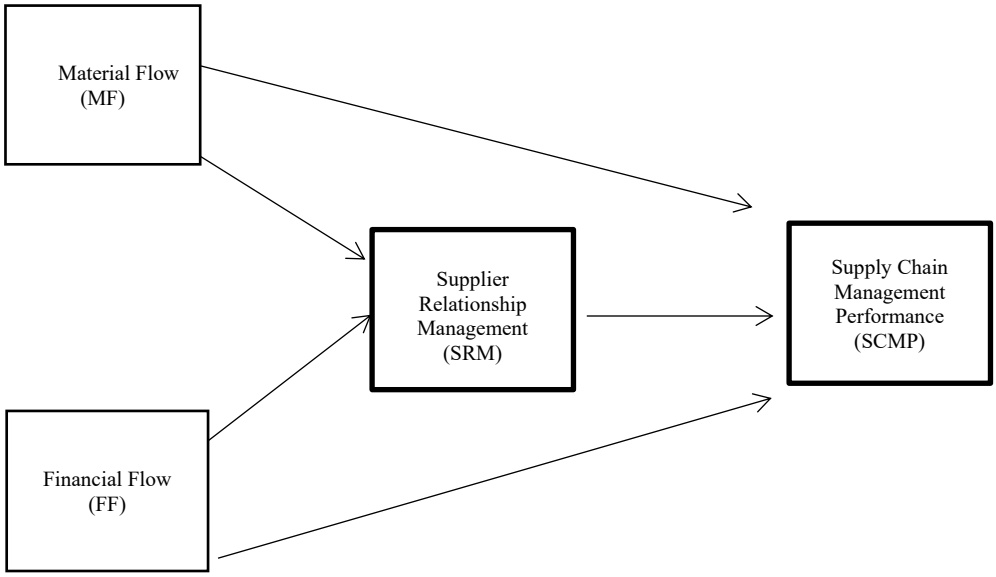

Figure 1. Research Framework

Based on several previous studies and reseach framework above, the hypothesis formulation are as follows:

H1: Material Flow significantly effect toward supply chain performance,

H2: Financial Flow significantly effect toward supply chain performance,

H3: Supplier management relationship significantly effect toward supply chain performance

H4: Material flow and financial flow through supplier relationship management significantly effect toward supply chain performance.

RESEARCH METHODS

Research on supply chain management performance is explorative in nature with survey techniques as a primary data collection tool. Consisting of 3 (three) research variables, namely exogenous variables in this study are material flow and financial flow, endogenous variables are supply chain management performance and supplier relationship management as mediating variables. Material flow is the description of the transportation of raw materials, pre-fabricates, parts, components, integrated objects and final products as a flow of entities. The term applies mainly to advanced modeling of supply chain management. The indicators are inventory quantity, lead time and out of stock. Financial flow consist of transactions and other flows, and represent the difference between the opening financial balance sheet at the start of the year and the closing balance sheet at the end of the year. Indicator are cash in flows and cash out flow. Then,

Supply chain performance is refers to the extended supply chain's activities in meeting end-customer requirements, including product availability, on-time delivery, and all the necessary inventory and capacity in the supply chain to deliver that performance in a responsive manner. Supplier relation management is a systematic approach to planning, evaluating, and managing goods or services from suppliers/vendors/providers. The indicators use inventory investment, inventory efficiency, forecasting accuracy. While supplier relationship management is the systematic approach to evaluating vendors that supply goods, materials and services to an organization, determining each supplier's contribution to success and developing strategies to improve their performance. The population in this study was the SME entities in the Gerbang Kertasusila area, East Java, Indonesia, totaling 124 units with a sample of 100 SME entities. The sampling technique used proportional random sampling.

The analysis technique for processing primary data consists of outer model and inner model analysis. In addition, a Goodness of fit model test is needed which aims to test the predictive power of the model and the feasibility of the model. The criteria that must be met include (a). Q2 predictive relevance to see the predictive power of the model => smartpls blindfolding output and (b). Model Fit to see whether the model and data are feasible to test the influence of variables. The requirement is that SRMR must be less than 0.10. Finally, the inner model test. This stage is carried out to test the significance of the direct influence of exogenous variables on endogenous variables, also, the significance of mediating variables on the influence of exogenous on endogenous. In this significance test, it can be stated to have a significant effect if the p value <0.05 or T value> 1.96 (Hair et al., 2021).

RESULTS AND DISCUSSION

RESEARCH RESULTS

1. Result of Outer Model

The results of the outer model analysis describe the relationship between latent variables and their indicators. This measurement model is used to test the validity and reliability of a construct. This outer model analysis can be carried out through several tests, namely convergent validity, discriminant validity, and composite reliability tests.

a). Convergent Validity is a measurement model with a reflective indicator model that is assessed based on the correlation between item scores and construct values.

The basis used in this test is that an indicator will be considered valid if the outer loading factor value is > 0.5 or the AVE (Average Variance Extracted) value is > 0.5 (Hair, 2021). The results are described in table 1 above. Based on table 1 shows that the outer loading factor value is > 0.5 for each variable. This means that the material flow, financial flow, supplier relationship management and supply chain management performance variables have high individual reflective measures and each item is valid. Furthermore, it can be seen in table 2 that the average variance extracted (AVE) value is > 0.5 for each variable. This means that the material flow, financial flow, supplier relationship

management and supply chain management performance variables have good convergent validity values and are valid.

b) Discriminant Validity

Discriminant validity is a measurement model with a reflective model of indicators that are assessed based on cross loading of measurements with constructs. The basis used in this test is that an indicator will be considered valid if the cross loading value is > 0.70. Based on table 3 shows that the cross loading value> 0.7 for each variable. The cross loading value for each variable has a higher value compared to the correlation of indicators and other variables. This means that each variable is able to predict the indicators in its block better than the indicators of other blocks. Therefore, it can be concluded that the construct of each item is discriminantly valid.

c) Composite Reliability

Composite reliability is a test conducted to prove accuracy and consistency in measuring constructs. A variable can be declared reliable if it has a composite reliability value > 0.7. In addition, this test can be strengthened by the cronbach's alpha value, where the criteria that must be met by a variable in order to be declared reliable are the same as composite reliability, namely the cronbach's alpha value > 0.7 (Ghozali & Latan, 2015).

Table 1. Convergent Validity

Indicators of Research Variables	Material Flow (X1)	Financial Flow (X2)	Supplier Relationship Management (Y1)	SCM Performance (Y2)	Notes
X1.1	0.761				Valid
X1.2	0.863				Valid
X1.3	0.803				Valid
X1.4	0.764				Valid
X1.5	0.769				Valid
X2.1		0.813			Valid
X2.2		0.811			Valid
X2.3		0.800			Valid
X2.4		0.763			Valid
X2.5		0.790			Valid
Y1.1				0.738	Valid
Y1.2				0.828	Valid
Y1,3				0.808	Valid
Y1.4				0.747	Valid
Y1.5				0.804	Valid

Indicators of Research Variables	Material Flow (X1)	Financial Flow (X2)	Supplier Relationship Management (Y1)	SCM Performance (Y2)	Notes
Y2.1			0.829		Valid
Y2.2			0.842		Valid
Y2.3			0.768		Valid
Y2.4			0.799		Valid
Y2.5			0.890		Valid

Source: processed of primary data, 2026

Table 2. *Average Variance Extracted* (AVE)

Research Variabel	*Average Variance Extracted* (AVE)	*Rule of Thumb*	Notes
Material Flow (X1)	0.628	> 0.05	Valid
Financial Flow (X2)	0.627		Valid
Supplier Realtionship Management (Y1)	0.670		Valid
SCM Performance (Y2)	0.620		Valid

Source: processed of primary data, 2026

Table 3. Cross Loading

Indicators of Research Variables	*Material Flow* (X1)	*Financial Flow* (X2)	*Supplier Relationship Management* (Y1)	SCM Performance (Y2)
X1.1	0.761	0.598	0.532	0.541
X1.2	0.863	0.744	0.523	0.585
X1.3	0.803	0.661	0.572	0.593
X1.4	0.764	0.650	0.556	0.653
X1.5	0.769	0.628	0.432	0.507
X2.1	0.728	0.813	0.513	0.653
X2.2	0.714	0.811	0.494	0.623
X2.3	0.652	0.800	0.428	0.627
X2.4	0.645	0.763	0.453	0.511
X2.5	0.609	0.790	0.498	0.584
Y1.1	0.561	0.619	0.424	0.738
Y1.2	0.579	0.598	0.589	0.828
Y1.3	0.513	0.546	0.602	0.808
Y1.4	0.526	0.531	0.510	0.747
Y1.5	0.536	0.599	0.601	0.804
Y2.1	0.533	0.565	0.605	0.812
Y2.3	0.636	0.613	0.583	0.799
Y2.3	0.606	0.592	0.610	0.760
Y2.4	0.549	0.501	0.829	0.615
Y2.5	0.529	0.498	0.842	0.641

Source: Processed of Primary Data, 2026

Based on table 4, it is revealed that the composite reliability and Cronbach's alpha values are > 0.70 for each variable. This means that the material flow, financial flow, supplier relationship management and supply chain management performance variables have high reliability and meet the reliable criteria. Thus, the quality of the measurement model used in this study is valid and reliable and can be continued to the outer model analysis stage.

2. Result of Inner Model

In this section, the results of the inner model analysis will be described, which are revealed by the large values of R square and Q square.

a). R *Square* (R^2)

R2 is a test used to measure how much the ability of exogenous variables to contribute to endogenous variables. The basis used in this test is if the R2 value is 0.75, 0.50, and 0.25, it means that the structural model is in the strong, moderate, and weak categories, respectively (Ghozali and Latan, 2015). Meanwhile, the results of data processing in this study are shown in the following table.

Table 4.Composite Reliability

Research Variables	*Composite Reliability*	*Cronbach's Alpha*	*Rule of Thumb*	Notes
Material Flow (X1)	0.944	0.934	> 0,70	Reliable
Financial Flow (X2)	0.944	0.934		Reliable
Supplier Relationship Management (Y1)	0.942	0.929		Reliable
SCM Performance (Y2)	0.929	0.912		Reliable

Source: Processed of primary Data, 2026

Table 5. R *Square* (R^2)

Research Variabel	*R Square*	*R Square Adjusted*
Supplier Relationship Management (Y1)	0.450	0.437
SCM Performance (Y2)	0.671	0.659

Source: Primary data processed, 2026

Based on table 5, it is revealed that the R2 value for the supplier relationship management variable is 0.450, which means that the material flow and financial flow variables have a moderate contribution of 45% to the supplier relationship management variable. While the R2 value for the supply chain management performance variable is 0.671. This means that the material flow, financial flow, and supplier relationship management variables have a strong contribution of 67% to the supply chain management performance variable.

b) Q *Square* (Q^2)

Q2 is a test used to assess model suitability. The basis used in this test is that if the Q2 value > 0, then the model has predictive relevance. Meanwhile, if the Q2 value <0, then the model lacks predictive relevance (Ghozali and Latan, 2015).

Table 6. Q *Square* (Q^2)

Research Variables	Q *Square*
Supplier Relationship Management (Y1)	0.289
SCM Performance (Y)	0.399

Source: Processed of primary Data, 2026

Based on table 6, it is revealed that the Q2 value > 0 for both the supplier relationship management variable and the supply chain management performance. This means that the model is considered to have predictive relevance. Table 6 also explains that material flow and financial flow have a contribution of 0.289 to the supplier relationship management variable. While material flow, financial flow and supplier relationship management have a contribution of 0.399 to the supply chain management performance variable.

c). Result of Hypotheses Test

Bootstrapping is a resampling procedure used to solve data problems that have a relatively small number of samples. The basis used in testing this hypothesis uses the criteria of t-statistic value > 1.96 and p value < 0.05 (significance level = 5%) (Ghozali & Latan, 2015).

Tabel 7. Hypotheses Test

`1=	Original Sample (O)	Standard Deviation	Ghjezzxxcccvbbbbn ,khffee yu	P Values
Material Flow → SCM Performance	0.530	0.160	3.307	0.001
Financial Flow → SCM Performance	0.408	0.167	2.452	0.015
Supplier Relationship Management → SCM Performance	0.404	0.120	3.373	0.001
Material & Financial Flow → Supplier Relationship Management → SCM Performance	0.466	0.174	2.895	0.041

Source: Processed of primary Data, 2026

Based on the results of the hypothesis test in table 7, both directly and indirectly it can be seen that the coefficient value is at a certain level of significance, where the basis

used to test the hypothesis is the t-statistic value> 1.96 and p value <0.05 (significance level 5%) (Hair, J. F. (2021). Based on table 7, it is revealed that the first hypothesis (H) 1 which states that material flow has a direct and significant effect on supply chain management performance is accepted. This is because it has a T-Statistic value of 3.307> 1.96 and a P value of 0.001 <0.05. The fourth hypothesis (H2) which states that financial flow has a significant effect on supply chain management performance is proven correct. This is because the T Statistics are 2.452> 1.96 and have P values of 0.015 <0.05. The third hypothesis (H3) which states that supplier relationships have a significant effect on supply chain management performance is also proven correct, This is because has a T-Statistic value of 3.373>1.96 and a P value of 0.001<0.05. Furthermore, the sixth hypothesis (H4) which states that supplier relationships mediate the influence of material flow & financial flow on supply chain management performance is also empirically proven to be true. This is because it has a T-Statistics of 2.895>1.96 and a P value of 0.041 <0.05.

DISCUSSION

The findings of this study demonstrate that material flow, financial flow, and supplier relationship management (SRM) significantly influence supply chain management performance (SCMP). Furthermore, SRM plays a mediating role in strengthening the relationship between both material and financial flows and SCMP. The structural model exhibits strong explanatory power ($R^2 = 0.671$) and predictive relevance ($Q^2 > 0$), indicating that the proposed model is robust in explaining supply chain performance. These results suggest that supply chain effectiveness is not only driven by operational efficiency but also by relational and financial coordination mechanisms (Chopra & Meindl, 2024; Christopher & Peck, 2004).

Material flow is confirmed as a critical determinant of supply chain performance, functioning as the operational backbone that ensures efficiency in inventory management, lead time reduction, and product availability. From a Resource-Based View (RBV) perspective, material flow represents a valuable operational capability that contributes to competitive advantage (Barney & Clark, 2007). This finding aligns with prior studies indicating that efficient inventory and logistics management significantly enhance supply chain outcomes (Oteki & Sakwa, 2020; Al Kurdi et al., 2022). Effective material flow enables firms to reduce operational costs while simultaneously improving responsiveness to market demand (Gunasekaran et al., 2017).

Beyond operational efficiency, material flow also influences service quality and customer satisfaction. A well-managed material flow ensures timely delivery and minimizes stockouts, which are essential components of customer-centric supply chains (Christopher, 2016). In this regard, forecasting based on historical demand patterns becomes a key mechanism for optimizing material planning. Advanced forecasting techniques supported by data analytics further enhance decision-making accuracy and supply chain responsiveness (Wang et al., 2016).

Supplier relationship management is also found to have a significant direct effect on supply chain performance. SRM reflects a relational capability that emphasizes trust, collaboration, and long-term partnerships between firms and suppliers. This finding is

consistent with the relational view, which posits that inter-organizational relationships are critical sources of competitive advantage (Dyer & Singh, 1998). Empirical studies have similarly confirmed that strong supplier relationships enhance coordination, reduce uncertainty, and improve overall supply chain performance (Anh & Ha, 2020; Yehuala, 2023; Aziz et al., 2023).

From a strategic perspective, SRM should not be viewed merely as a supporting function but as a core enabler of supply chain performance. Strong supplier relationships facilitate information sharing, joint problem-solving, and risk mitigation, which are essential in dynamic and uncertain environments (Scholten & Schilder, 2015). In addition, SRM enhances supply continuity and resilience, enabling firms to respond more effectively to disruptions (Christopher & Lee, 2004).

One of the key contributions of this study lies in identifying the mediating role of SRM in the relationship between material flow, financial flow, and supply chain performance. The findings indicate that SRM significantly mediates both relationships, suggesting that operational and financial efficiencies alone are insufficient without strong relational mechanisms. This supports the argument that supply chain performance is achieved through the integration of multiple flows and relational coordination (Flynn et al., 2010).

Interestingly, the mediating effect of SRM is stronger in the relationship between financial flow and supply chain performance compared to material flow. This can be explained by the fact that financial transactions rely heavily on trust, payment reliability, and contractual agreements between supply chain partners. Financial flow management involves high levels of interdependence, making relational quality a critical factor (Pfohl & Gomm, 2009). In contrast, material flow is more operationally driven and less dependent on relational dynamics.

These findings contribute to the theoretical development of supply chain management by extending the Resource-Based View. Specifically, this study integrates three types of capabilities: operational (material flow), financial (financial flow), and relational (SRM). By introducing SRM as a mediating variable, this research provides a deeper understanding of the mechanisms through which supply chain performance is achieved. This addresses a gap in the literature, which has predominantly focused on direct effects rather than mediation mechanisms (Huo et al., 2014).

From a managerial perspective, the results highlight the importance of adopting an integrated approach to supply chain management. Firms should not only focus on optimizing material and financial flows but also invest in developing strong supplier relationships. Strategic SRM practices, such as supplier collaboration, performance evaluation, and long-term contracting, are essential for enhancing both financial efficiency and supply chain resilience (Li et al., 2023).

Finally, this study offers a conceptual advancement by proposing a flow-driven and relationship-enabled model of supply chain performance. The findings support a reconstruction of traditional RBV-based models by incorporating relational mechanisms as key mediators. In this model, supply chain performance is the result of the interaction between resources, capabilities, and inter-organizational relationships. Therefore, supply

chain success is not solely determined by internal efficiency but also by the quality of collaboration among supply chain actors.

CONCLUSION

Based on the research result analysis, it can be concluded that in order to improve supply chain performance, manager should concern with material management and financial management as well. It means that manager should manage material flow and financial flow as fast as possible. Even, to multiply supply chain performance, it should be create good relationship with supplier. In other words, It require long time of supplier relationship management.

SUGGESTION

By that way, supply chain performance can be improved better that finally contribute to the company goal achievement overall. However, further research is still required particularly dealing with green supply chain. That is due to green economy become extremely important in the next decade

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