JPB REVIEW
INTERNATIONAL JOURNAL OF PROFESSIONAL BUSINESS REVIEW
ISSN: 2525-3654
OPEN ACCESS

STRUCTURAL EQUATION MODELING OF SUPPLY CHAIN MANAGEMENT IMPACT ON FIRM PERFORMANCE

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ARTICLE INFO

Article history:

Received: April, 11th 2024

Accepted: June, 11th 2024

Keywords:

Supply Chain Management;
Agri-Food Industry;
Firm Performance;
Structural Equation Modeling;
SEM-PLS.

ABSTRACT

Objective: This study aims to examine the impact of supply chain management (SCM) practices on firm performance within the agri-food industry, utilizing Structural Equation Modeling (SEM) to analyze the relationships between SCM factors and firm performance indicators.

Theoretical Framework: The study is grounded in the understanding that effective SCM practices can significantly influence firm performance in volatile and competitive markets, particularly within the agri-food sector.

Method: Data collection involved face-to-face questionnaires to ensure comprehensive responses from participants. Structural Equation Modeling (SEM) was employed for analysis, utilizing SmartPLS 3 software for data processing.

Results and Discussion: The results reveal significant positive relationships between SCM practices and firm performance indicators, including economic-financial and commercial dimensions. The discussion delves into the varying effect sizes observed and highlights the critical role of SCM in enhancing organizational outcomes.

Implications of the Research: This study offers valuable insights into strategies for improving operational efficiency and competitiveness within the agri-food industry, emphasizing the importance of effective SCM practices in driving firm performance.

Originality/Value: By shedding light on the interplay between SCM dynamics and firm performance in the agri-food sector, this research contributes to enriching our understanding of the field and provides practical implications for industry practitioners and policymakers.

Doi: https://doi.org/10.26668/businessreview/2024.v9i7.4411

MODELAGEM DE EQUAÇÕES ESTRUTURAIS DO IMPACTO DA GESTÃO DA CADEIA DE SUPRIMENTOS NO DESEMPENHO DA EMPRESA

RESUMO

Objetivo: Este estudo tem como objetivo examinar o impacto das práticas de gestão da cadeia de suprimentos (SCM) no desempenho das empresas dentro da indústria agroalimentar, utilizando Modelagem de Equações Estruturais (SEM) para analisar as relações entre os fatores de SCM e os indicadores de desempenho empresarial. Referencial Teórico: O estudo está fundamentado na compreensão de que práticas eficazes de SCM podem influenciar significativamente o desempenho das empresas em mercados voláteis e competitivos, especialmente dentro do setor agroalimentar.

Estrutura Teórica: O estudo baseia-se no entendimento de que práticas eficazes de SCM podem influenciar significativamente o desempenho da empresa em mercados voláteis e competitivos, especialmente no setor agroalimentar.

Método: A coleta de dados envolveu questionários presenciais para garantir respostas abrangentes dos participantes. A Modelagem de Equações Estruturais (SEM) foi empregada para análise, utilizando o software SmartPLS 3 para processamento de dados.

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Resultados e Discussão: Os resultados revelam relações positivas significativas entre as práticas de SCM e os indicadores de desempenho empresarial, incluindo dimensões econômico-financeiras e comerciais. A discussão aprofunda os diferentes tamanhos de efeito observados e destaca o papel crítico do SCM na melhoria dos resultados organizacionais.
Implicações da Pesquisa: Este estudo oferece insights valiosos sobre estratégias para melhorar a eficiência operacional e a competitividade dentro da indústria agroalimentar, enfatizando a importância das práticas eficazes de SCM na condução do desempenho empresarial.
Originalidade/Valor: Ao iluminar a interação entre a dinâmica do SCM e o desempenho empresarial no setor agroalimentar, esta pesquisa contribui para enriquecer nossa compreensão do campo e fornece implicações práticas para profissionais da indústria e formuladores de políticas.

Palavras-chave: Gestão da Cadeia de Suprimentos, Indústria Agroalimentar, Desempenho Empresarial, Modelagem de Equações Estruturais, SEM-PLS.

MODELADO DE ECUACIONES ESTRUCTURALES DEL IMPACTO DE LA GESTIÓN DE LA CADENA DE SUMINISTRO EN EL DESEMPEÑO DE LA EMPRESA

RESUMEN
Objetivo: Este estudio tiene como objetivo examinar el impacto de las prácticas de gestión de la cadena de suministro (SCM) en el desempeño de las empresas dentro de la industria agroalimentaria, utilizando Modelado de Ecuaciones Estructurales (SEM) para analizar las relaciones entre los factores de SCM e indicadores de desempeño empresarial.
Marco Teórico: El estudio se fundamenta en la comprensión de que las prácticas efectivas de SCM pueden influir significativamente en el desempeño de las empresas en mercados volátiles y competitivos, especialmente dentro del sector agroalimentario.
Método: La recolección de datos involucró cuestionarios presenciales para garantizar respuestas integrales de los participantes. Se empleó Modelado de Ecuaciones Estructurales (SEM) para el análisis, utilizando el software SmartPLS 3 para el procesamiento de datos.
Resultados y Discusión: Los resultados revelan relaciones positivas significativas entre las prácticas de SCM e indicadores de desempeño empresarial, incluyendo dimensiones económico-financieras y comerciales. La discusión profundiza en los diferentes tamaños de efecto observados y destaca el papel crítico del SCM en la mejora de los resultados organizacionales.
Implicaciones de la Investigación: Este estudio ofrece ideas valiosas sobre estrategias para mejorar la eficiencia operativa y la competitividad dentro de la industria agroalimentaria, enfatizando la importancia de las prácticas efectivas de SCM en la conducción del desempeño empresarial.
Originalidad/Valor: Al arrojar luz sobre la interacción entre la dinámica del SCM y el desempeño empresarial en el sector agroalimentario, esta investigación contribuye a enriquecer nuestra comprensión del campo y proporciona implicaciones prácticas para profesionales de la industria y formuladores de políticas.

Palabras clave: Gestión de la Cadena de Suministro, Industria Agroalimentaria, Desempeño Empresarial, Modelado de Ecuaciones Estructurales, SEM-PLS.

1 INTRODUCTION

Supply Chain Management (SCM) is an essential component of the global industrial landscape, having evolved beyond its initial purpose as a logistical function. Industry and academic stakeholders alike agree that efficient supply chain management is essential to success (Monjur & Akon, 2023). The constant interplay of processes, decisions, and structures has led to a considerable evolution in the complexity of logistics chains during the past 20 years,

despite the discipline being mature (Richey et al., 2022). Understanding this complexity is crucial for gaining a competitive advantage in the market.

Different definitions of SCM come from different fields and trends. It is difficult to come up with a single, widely accepted definition of supply chain management (SCM), however SCM may be seen as a management philosophy and approach that promotes the adoption of a holistic chain vision that runs upstream to downstream. Stakeholder coordination guarantees the attainment of objectives, decrease in expenses, and an improved quality of service for the final customer (Ahmed et al., 2020).

In the ever-evolving landscape of modern business, effective SCM has become a strategic linchpin for organizational success. The complex orchestration of procurement, production, logistics, and information flow within a supply chain has transformed into a significant force influencing overall performance and competitiveness (Mentzer et al., 2001). Effective SCM practices have been recognized to influence various facets of organizational performance, ranging from cost reduction to customer satisfaction (Cahyono et al., 2023).

This recognition of the pivotal role of SCM in organizational success extends to its impact on firm performance. The complexity of SCM has undergone significant evolution, driven by dynamic interactions among processes, decisions, and structures. When it comes to supply chain optimization and performance enhancement, this intricacy presents opportunities as well as problems to organizations (Rini et al., 2023). Effective SCM practices are known to exert a profound influence on various facets of organizational performance, spanning economic, financial, and commercial dimensions. Research has highlighted the positive impact of successful SCM practices on cost reduction, operational efficiency, customer satisfaction, and market competitiveness (Nimeh et al, 2018; Lenny Koh et al., 2007; Truong et al., 2017). Despite the recognized importance of SCM in driving organizational success, the nuances of how specific SCM practices impact various dimensions of performance remain underexplored.

This study seeks to address this gap by examining the influence of SCM practices on organizational performances. By adopting a comprehensive approach, we aim to provide valuable insights into the complex interplay between SCM practices and organizational outcomes.

Moreover, the direct effect link has received less attention in prior research, which has mostly focused on analyzing the indirect effect relationship. Furthermore, previous studies have mostly concentrated on industrialized nations, paying little attention to growing economies, especially those in Morocco's agro-alimentary sector. This study aims to investigate the relationship between supply chain management activities and company performance in light of these gaps.

In addition, this research aims to address this issue by deploying a Structural Equation Modeling (SEM) approach, allowing for a holistic examination of the latent constructs and their reflective measures. The goal is to unravel the intricate causal relationships and interdependencies within the chosen SCM variables, shedding light on their influence on firm performance's dimensions.

2 THEORETICAL FRAMEWORK

2.1 KEY COMPONENTS OF SUPPLY CHAIN MANAGEMENT

2.1.1 Inventory and transportation management

Inventory and transportation management are important aspects of supply chain management (Krichen, 2022). The integration of inventory and transportation operations is crucial for achieving a balance between supply and demand and minimizing operating costs in the supply chain (Qian et al., 2022). The optimization of inventory routing and transportation processes can lead to cost savings and improved efficiency. Transportation operations have a significant impact on decision-making in various supply chain activities, including procurement, production, inventory management, and distribution (Helms & Dileepan ,2005).

2.1.2 Order process automatisation

Order process automatisation and supply chain management are closely related concepts. Automating order management processes can lead to improved efficiency and productivity in the flow of orders, as well as better information management and decision-making (Verma et al., 2020). By automating the registration of orders, micro-companies can optimize their marketing efforts and gain a comprehensive view of their performance (Yoshitake et al.,2021). Additionally, an order management device can use automation to manage the shipping work related to products to be shipped, including determining the likelihood of competition for specific conveyance shelves and setting the number of products to be shipped accordingly (Yoshitake et al., 2021).

2.1.3 Information flow management

Information flow management is an important aspect of supply chain management. Accurate and timely information flow within the supply chain is crucial for decision-making and reducing uncertainties. Effective information flow is associated with better financial outcomes, optimized processes, and improved overall economic performance (Nascimento et al., 2021). Effective management of information and document flows within an organization is crucial for optimizing access and retrieval efficiency (Rathnasingheet al., 2020). The use of information systems, combined with strong interorganizational relationships and collaboration, can support SCM practices and bring business advantages.

2.2 INSIGHTS INTO THE RELATIONSHIP BETWEEN SCM AND ORGANIZATIONAL PERFORMANCE

In the literature, studies conducted across diverse geographical contexts consistently emphasize the pivotal role of supply chain management (SCM) in driving organizational performance. Notably, research has highlighted a direct correlation between SCM maturity and firms' financial performance, thus emphasizing the criticality of effective SCM as a determinant of success (D'Avanzo et al., 2003). Similarly, Albalushi et al. (2023) underscore the importance of enhancing supply chain velocity and efficiency. They argue that optimizing processes, minimizing inbound lead times, and eliminating non-value-added time are essential strategies for achieving these goals. This aligns with previous research findings regarding the significant impact of SCM practices on overall organizational performance.

Further investigations have underscored the positive association between logistical flexibility and firm performance. Findings emphasize the broader importance of flexibility in bolstering organizational outcomes (Sánchez & Pérez, 2005). Similarly, studies have provided additional evidence supporting the beneficial impact of SCM strategy on various aspects of firm performance, spanning logistical, commercial, and financial dimensions (Green et al., 2008).

This pattern of findings extends beyond national borders, with research conducted in countries including Brazil, France, China, and Kenya reinforcing the tangible advantages of efficient SCM practices. Studies have highlighted how such practices contribute to cost reduction, operational flexibility, customer satisfaction, and overall firm performance (McCormack et al., 2008; Mwangangi, 2016).

Moreover, recent literature has further elucidated the relationship between SCM and business performance. Studies demonstrate a positive association between SCM and various dimensions of business performance, encompassing financial, customer, innovation and learning, and internal processes perspectives (Pejić Bach et al., 2023).

Additionally, the role of human resource management (HRM) practices in enhancing SME performance through SCM implementation has been emphasized. Furthermore, the positive impact of market orientation and SCM strategy on SME financial and operational performance has been highlighted, with market performance acting as a mediating factor (Mamun, 2023; Jamaludin et al., 2022).

Furthermore, insights into sustainable supply chain management (SSCM) have been provided, elucidating its significant role in improving firms' operational and financial performance. Studies underscore the importance of various components within SSCM, including supply chain strategy, network design, organizational structure, and information systems (Fu et al., 2022).

In fact, SCM practices are known to exert a profound influence on various facets of organizational performance, spanning economic, financial, and commercial dimensions. A significant positive impact was found between information quality and information sharing (on competitive advantage (Baqlehet al., 2023). This highlights the interconnected nature of SCM practices and their pivotal role in enhancing overall organizational effectiveness and market.

Research has highlighted the positive impact of successful SCM practices on cost reduction, operational efficiency, customer satisfaction, and market competitiveness (Green et al., 2008; McCormack et al., 2008; Mwangangi, 2016; Pejić Bach et al., 2023; Mamun, 2023; Jamaludin et al., 2022).

Within the realm of SCM, specific components such as inventory and transportation management, order process automatisation, and information flow management play crucial roles in shaping organizational outcomes. However, the nuanced interplay between specific SCM components-inventory and transportation management (GT), order process automatisation (GC), and information flow management (GFI)-and the ultimate outcomes of economic and financial performance and commercial performance remains an area demanding deeper investigation.

H1: Inventory and transportation management significantly impact the economic and financial performance of firms in the Moroccan agri-food industry.

H2: Inventory and transportation significantly impact the commercial performance of firms in the Moroccan agri-food industry.

H3: Order process automatisation significantly impact the economic and financial performance of firms in the Moroccan agri-food industry.

H4: Order process automatisation significantly impact the commercial performance of firms in the Moroccan agri-food industry.

H5: Information flow management significantly impact the economic and financial performance of firms in the Moroccan agri-food industry.

H6: Information flow management significantly impact the commercial performance of firms in the Moroccan agri-food industry.

3 METHODOLOGY

Causal modeling techniques, notably Structural Equation Modeling (SEM), have gained considerable traction among management science scholars in the last two decades (Fernandes, 2012). Additionally, the application of Partial Least Squares (PLS) structural equation modeling has surged in popularity among researchers in the field of supply chain management (Kaufmann & Gaeckler, 2015). Following this trend, our study adopts a quantitative research approach and employs a cross-sectional research design. Given the study's objective of exploring correlational relationships among variables, a correlational research design is utilized.

Data collection involves the distribution of self-administered questionnaires among supply chain managers in the agroalimentary industry, chosen for their comprehensive understanding of SCM activities. We do not have any missing data since we distributed the questionnaire using face-to-face interviews and collected it immediately afterward. In fact, the questionnaire was filled out in our presence. This method allowed us to explain any unclear points, ensure the consistency of responses, and also avoid missing data. The questionnaire, adapted from prior research, employs a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

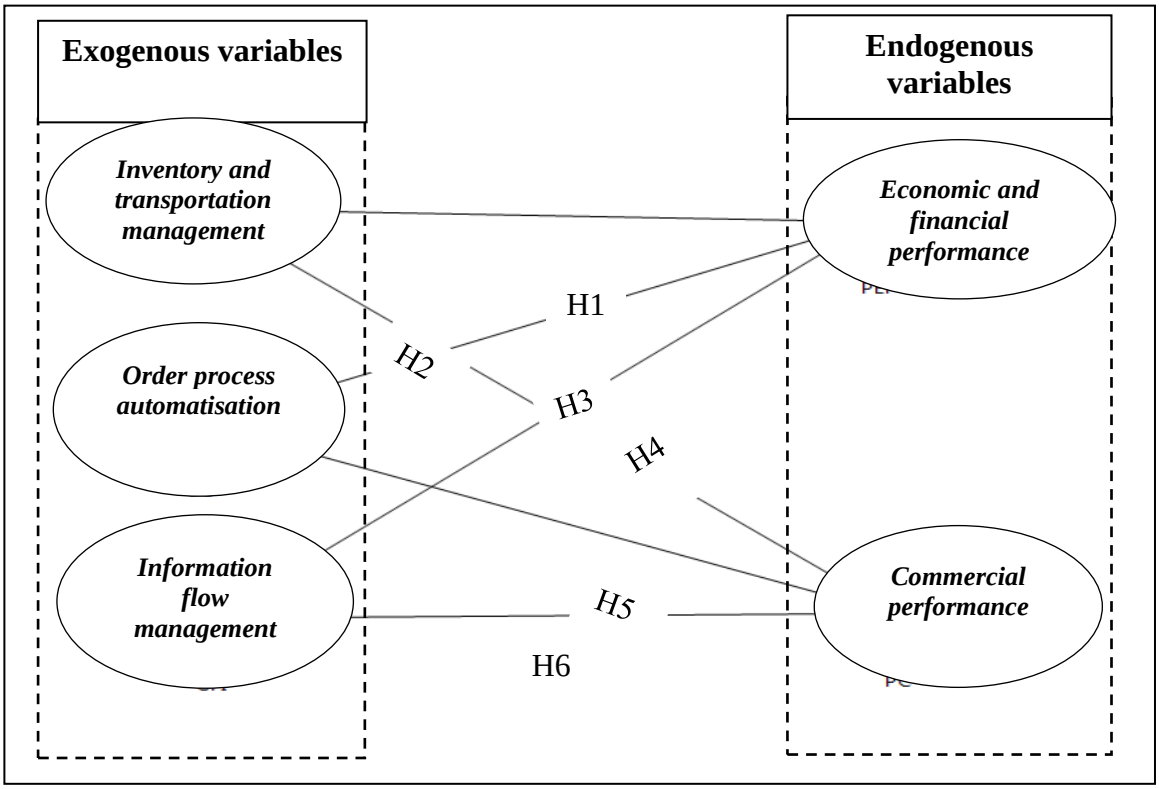
The analysis of the study has been conducted by Smart PLS 3. The Partial Least Square (PLS)- Structural Equation Modeling (SEM) technique approach proves suitable for conducting exploratory analyses and testing partial models, especially when researchers face constraints such as limited sample size or inadequate measurement scales (Lacroux, 2011), as is the case in our study. This limitation is common in research within emerging disciplines like supply

chain management. Despite the prevalence of confirmatory reasoning in many logistics studies aimed at validating theory in specific empirical contexts, these studies often possess an exploratory empirical nature. It is important to highlight the absence of such study types in the Moroccan context. Additionally, the PLS method is particularly well suited for addressing logistics issues where data collection relies on questionnaires.

After opting for Partial Least Squares structural equation modeling (PLS-SEM), we specified our conceptual structural model, which serves as our internal model for estimation. We simply outlined the hypothetical relationships we aim to validate and estimate in the following "path" model diagram (Figure 1).

Figure 1

Presentation of the internal structural model



Source: Prepared by the Author (2023)

Before developing our measurement model, it is important to specify that we have chosen the reflective measurement model, which will apply to all our variables. Our choice is based on the fact that all measures represent the effects (or manifestations) of the latent construct. Therefore, causality comes from the construct towards its reflective measures/indicators. This means that just-in-time (JIT), warehouse organization (WO), inventory control (IC), reliability (REL), and speed (SPD) are just a representative sample of

all possible measures available related to inventory and transportation management (GT). Order process automation (GC) has a reflective indicator (degree of automation (DA)). Similarly, information flow management (GFI) follows the same reasoning and consists of reflective measures (information sharing (ISH) and use of information systems (UIS)). All these measures reflect the exogenous constructs.

For the endogenous variables related to performance, we have also chosen the reflective model type. The same justifications apply. In fact, market share (MSH), profitability (PR), sales growth (SG), return on investment (ROI), and asset growth (AGTH) are just the determinants chosen from theory to measure economic and financial performance. These indicators cannot be exhaustive or interchangeable. The same applies to reflective indicators (good brand image (GBI) and product quality (PQ)), which measure commercial performance (PC).

To estimate the parameters of the conceptual model, we employed SmartPLS 3 software. The results can be comprehensively evaluated in three phases: initially, focusing on the measurement model, followed by the structural model, and ultimately, assessing the overall model and hypothesis testing.

4 RESULTS AND DISCUSSION

4.1 THE ASSESSMENT OF THE VALIDITY OF THE MEASUREMENT MODEL

4.1.1 Reliability of internal consistency

We evaluated the reliability of our data in terms of internal consistency by calculating the composite reliability. This index was considered more robust than Cronbach's alpha for judging the reliability of measurements (Hair, 2017). The Table 1 presented the values of composite reliability for each latent variable in our model.

Table 1

Results of Composite Reliability

Variables	Composite Reliability	Average Variance Extracted (AVE)
PL	0.997	0.993
RM	0.852	0.666
RS	0.718	0.563
RSM	0.859	0.675

Source: Prepared by the Author (2023)

Four values exceeded 0.7, which was considered a satisfactory threshold according to Tenenhaus et al. (2005). Thus, we concluded that our measurement model was reliable in terms of internal consistency.

4.1.2 Converent validity

The contributions of the 15 indicators to their respective factors are above 0.7, which is satisfactory. However, 3 indicators have contributions between 0.4 and 0.7, which is acceptable especially when the scales are newly developed (Hair, 2017; Hulland, 1999). Thus, convergent validity is ensured according to this criterion. Table 2 below presents the findings on factor contributions.

Table 2

Convergent Validity Results / Factor Contributions

	GC	GFI	GST	PC	PEF
GBI				**0,953**	
IC			**0,742**		
SG					**0,918**
AGTH					**0,927**
DA	**1,000**				
REL			0,586		
JIT			**0,826**		
PQ				**0,936**	
WO			**0,944**		
ISH		0,604			
MSH					**0,889**
SPD			0,625		
ROI					**0,858**
PR					**0,844**
UIS		**0,967**			

Source: Prepared by the Author (2023)

We analyzed the shared variance between a construct and its measures to evaluate convergent validity, as suggested by Chin (1998). The values of the average variance extracted are presented in Table 3. The average variance extracted for all constructs is greater than 0.5. Therefore, convergent validity is also assured according to the second AVE criterion.

Table 3

Convergent Validity Results / Average Variance Extracted

Variables	Average Variance Extracted (AVE)
GC	**1,000**
GFI	**0,650**
GST	**0,572**
PC	**0,892**
PEF	**0,788**

Source: Prepared by the Author (2023)

4.1.3 Discriminant validity

We observe that each indicator is more correlated with its own construct than with the other constructs in the model. Additionally, by analyzing cross-loadings, we find that the indicators exhibit stronger correlations with their respective constructs compared to other constructs in the model (Table 4). Therefore, it can be concluded that all indicators belong to their respective constructs, establishing discriminant validity according to this criterion.

Table 4

Results of Discriminant Validity / Cross-loadings

Variables	GC	GFI	GST	PC	PEF
GBI	0,105	0,350	0,288	0,953	0,607
PQ	0,060	0,338	0,204	0,936	0,463
DA	1,000	-0,056	0,217	0,089	0,362
REL	0,319	-0,219	0,586	-0,159	-0,132
JIT	0,134	-0,032	0,826	0,031	0,179
SPD	0,107	0,054	0,625	0,065	-0,020
WO	0,318	-0,082	0,944	0,227	0,404
IC	0,113	-0,042	0,742	0,075	0,123
ISH	-0,123	0,604	-0,044	0,095	0,124
UIS	-0,026	0,967	0,002	0,392	0,255
PDM	0,386	0,257	0,383	0,481	0,889
AGTH	0,280	0,273	0,434	0,473	0,927
SG	0,266	0,309	0,318	0,567	0,918
ROI	0,166	0,186	0,331	0,516	0,858
PR	0,446	0,110	0,491	0,510	0,844

Source: Prepared by the Author (2023)

By examining the Fornell-Larcker Criterion, we compared the average variance of each construct (found on the diagonal of Table 5) with the correlations presented in the other cells of the same table. It is evident that the average variance of each construct exceeds the correlations of the same construct with others. Therefore, we can conclude that our constructs represent distinct and separate units. This implies the discriminant validity of the measurement model.

Table 5

Discriminant Validity Results / Fornell-Larcker Criterion

Variables	GC	GFI	GST	PC	PEF
GC	**1,000**				
GFI	-0,056	**0,806**			
GS	0,217	-0,010	**0,756**		
PC	0,089	0,364	0,264	**0,944**	
PEF	0,362	0,254	0,449	0,572	**0,888**

Source: Prepared by the Author (2023)

Our measurement model ensures internal consistency reliability, convergent validity, and discriminant validity. Therefore, our measurement model is reliable and valid. This leads us to validate the structural model, which we will address in the following section.

4.2 ASSESSING THE VALIDITY OF THE STRUCTURAL MODEL

4.2.1 Evaluation of the explained variance of latent endogenous variables (R^2)

Upon calculation of the coefficient of determination (R^2) for each endogenous variable, it was found that 20.7% of the variance in commercial performance can be explained by the three explanatory variables: inventory and transportation management, order process automatisation, and information flow management. While this percentage is considered moderate according to Cohen (1988) and weak according to Chin (1998), it remains acceptable in all cases.

Regarding economic and financial performance, the R^2 stands at 35.1%, which is regarded as substantial by Cohen (1988) and moderate by Chin (1998). Thus, 35.1% of the variance in economic and financial performance is elucidated by the three exogenous latent variables: inventory and transportation management, order process automatisation, and information flow management.

4.2.2 Effect Size Evaluation (f^2)

To assess the effect size, we computed (f^2), which represents the relative impact of the exogenous latent variables GST, GC, and GFI on the endogenous latent variables PC and PEF individually. The results of the f^2 effect sizes are presented in Table 6, and following Cohen's (1988) interpretations, we gain valuable insights into the relationship between the exogenous

and endogenous variables in our structural model. Firstly, the analysis reveals that the influence of GST on PEF (economic and financial performance) is of moderate magnitude, indicating a significant effect of inventory and transportation management on economic and financial performance. However, the effect of GST on PC (commercial performance) is relatively smaller, suggesting a lesser impact of inventory and transportation management on commercial performance. Similarly, the impact of GC (order process automation) on both PEF and PC is determined to have small effects, implying a limited influence of order process automatisation on economic and financial performance as well as commercial performance. Intriguingly, the analysis suggests that GFI (information flow management) has a small effect on PEF but a moderate effect on PC, highlighting a more pronounced influence of information flow management on commercial performance compared to economic and financial performance.

Table 6

Results of the f^2 Effect Size

Variables	PC	PEF
GC	**0,004**	0,126
GFI	0,172	0,116
GST	0,079	0,222

Source: Prepared by the Author (2023)

4.2.3 The assessment of the model's predictive relevance (Q^2)

To evaluate predictive relevance, we assessed the Stone-Geisser Q^2 value. This metric, obtained through the Blindfolding procedure, measures the predictive quality of the latent variables in the PLS path model. Blindfolding systematically removes data and predicts their original values. Our analysis yielded Q^2 values of 0.150 for the commercial performance model (PC) and 0.244 for the economic and financial performance model (PEF). These results indicate predictive quality, as Q^2 values exceeding 0 suggest adequate predictive capability according to Tenenhaus et al. (2005) and Hair (2017).

4.2.4 The test of the significance of regression coefficients

To test the significance of the regression coefficients, we employed the Bootstrap method, a resampling technique with replacement. We conducted 500 resamples to ensure stable results, following the recommendation of Tenenhaus et al. (2005), although a minimum

of 100 resamples is typically advised. The results of the Test of the Significance of Regression Coefficients are presented in Table 7.

Table 7

Significance of Regression Coefficients after Bootstrapping

Links	T Statistics	P Values	Result
GC -> PC	0.463	0.643	Non-significant
GC -> PEF	2.832	0.005	Significant at 1% level
GFI -> PC	2.719	0.007	Significant at 1% level
GFI -> PEF	2.403	0.017	Significant at 5% level
GST -> PC	1.895	0.058	Significant at 10% level
GST -> PEF	2.267	0.023	Significant at 5% level

Source: Prepared by the Author (2023)

4.3 EVALUATION OF THE OVERALL MODEL

The evaluation of the overall model involves calculating the Goodness of Fit (GOF) index, which considers both the performance of the structural model and that of the measurement model. We calculated the GOF index ($\sqrt{\overline{AVE} \times \overline{R^2}}$) for our model and we obtained a GOF value of 0.466600379. Following the guidelines of Wetzels et al. (2009), our GOF index exceeds 0.36. Therefore, the model's fit quality is considered strong. This level of fit quality is sufficient to validate our overall SEM-PLS model.

The results from evaluating our structural model indicate that it has predictive validity. Thus, it is valid for predicting the relationships between supply chain management components and firm performance, whether economic and financial or commercial. Additionally, the quality of fit for the overall model is significant, further affirming the validity of both the internal and external structural model.

This assessment of the structural model reveals that the explained variance of performance by supply chain management ranges from substantial to moderate, depending on the type of performance considered. This variance is attributed to the various effects of each supply chain management component on performance.

4.4 HYPOTHESIS TESTING

Based on the results of SEM-PLS, we can summarize the main elements of our model to validate or invalidate our research hypotheses, as elucidated in the following Table 8.

Table 8

Summary of SEM-PLS Model Results

Hypothesis	Causal Relationships	Path Coefficient (β)	T-Statistic	P Value	Effect Size (f^2)	Hypothesis Validation
H1	GST -> PEF	0.388	2.267	0.023••	0.222**	VALID
H2	GST -> PC	0.256	1.895	0.058•	0.079*	VALID
H3	GC -> PEF	0.293	2.832	0.005•••	0.126*	VALID
H4	GC -> PC	0.054	0.463	0.643	0.004	INVALID
H5	GFI -> PEF	0.275	2.403	0.017••	0.116*	VALID
H6	GFI -> PC	0.370	2.719	0.007•••	0.172**	VALID

•••Significant at 1% (T>2.57) ** Moderate effect
••Significant at 5% (T>1.96) *Weak effect
•Significant at 10% (T>1.64)
Source: Prepared by the Author (2023)

Three exogenous variables, inventory and transportation management, order process automatisation, and information flow management, all have a positive and statistically significant influence on economic and financial performance, albeit with varying effect sizes. However, for commercial performance, only inventory and transportation management and information flow management have a positive and statistically significant influence (with divergent effect sizes). Interestingly, order process automatisation does not exhibit any effect on commercial performance. This positive link between supply chain management and firm performance is also affirmed in the works of (Wisner, 2003), (Li et al., 2009), (Green et al., 2008), (Fugate et al., 2010), (Chow et al., 2008), and (Yeung et al., 2008).

Acknowledging direct links without intermediary variables in research findings is significant as it implies a clearer understanding of the relationship between variables. This can enhance the reliability and applicability of the findings, as they provide a more straightforward explanation of the observed phenomenonas evident, the only non-existent direct link lies between order process automatisation and commercial performance. However, the hypothesis that a positive link may exist remains valid if different measurement indicators are chosen. Nonetheless, the nature of this link remains to be determined.

5 CONCLUSION

In conclusion, our study focused on evaluating the relationship between supply chain management (SCM) practices and firm performance in the context of agri-food industry. Through the application of Structural Equation Modeling (SEM) with Partial Least Squares

(PLS), we assessed both the measurement and structural models to gain insights into the impact of SCM practices on various dimensions of firm performance.

Our findings reveal that supply chain management practices, including inventory and transportation management, order process automation, and information flow management, exert significant and positive influences on economic and financial performance. Moreover, these practices exhibit varying effects on commercial performance, with inventory and transportation management and information flow management significantly impacting commercial performance, while order process automation shows no significant effect.

The results underscore the importance of supply chain management practices in enhancing firm performance, aligning with prior research indicating a positive link between SCM and organizational outcomes. However, our study contributes by providing direct empirical evidence of these relationships within our specific industry context. Furthermore, the evaluation of the overall model quality, as indicated by the Goodness-of-Fit (GOF) index, suggests a strong fit between the proposed model and the observed data, affirming the validity of our structural equation model.

This study contributes to the growing body of literature on supply chain management and firm performance by providing empirical evidence of the direct relationships between SCM practices and various dimensions of organizational performance. These insights hold significance for practitioners and decision-makers seeking to optimize their supply chain strategies to drive organizational success.

While our study provides valuable insights, it is not without limitations. The generalizability of our findings may be constrained by the specific industry context under investigation. Future research endeavors could explore other industries to enhance the generalizability of our conclusions. Additionally, employing longitudinal research designs could offer deeper insights into the causal relationships between SCM practices and firm performance over time.

REFERENCES

Ahmed, W., Ashraf, M. S., Khan, S. A., Kusi-Sarpong, S., Arhin, F. K., Kusi-Sarpong, H., & Najmi, A. (2020). Analyzing the impact of environmental collaboration among supply chain stakeholders on a firm's sustainable performance. *Operations Management Research*, *13*, 4-21.

Albalushi, J., Mishra, R., & Abebe, M. (2023). Supply Chain Resilience Meets Quality Management/A Resiliencia Da Cadeia De Fornecimento Atende A Gestao Da

Qualidade/La Resiliencia De La Cadena De Suministro Se Encuentra Con La Gestion De Calidad. *International Journal of Professional Business Review*, *8*(12).

Baqleh, L. A., & Alateeq, M. M. (2023). The Impact of Supply Chain Management Practices on Competitive Advantage: The Moderating Role of Big Data Analytics. *International Journal of Professional Business Review: Int. J. Prof. Bus. Rev.*, *8*(3), 3.

Cahyono, Y., Purwoko, D., Koho, I., Setiani, A., Supendi, S., Setyoko, P., & Wijoyo, H. (2023). The role of supply chain management practices on competitive advantage and performance of halal agroindustry SMEs. *Uncertain Supply Chain Management*, *11*(1), 153-160.

Chin, W. W. (1998). The partial least squares approach for structural equation modeling. In *Modern methods for business research* (pp. 295-336). Lawrence Erlbaum Associates Publishers.

Chow, W. S., Madu, C. N., Kuei, C.-H., Lu, M. H., Lin, C., & Tseng, H. (2008). Supply chain management in the US and Taiwan: An empirical study. *Omega*, *36*(5), 665-679.

Christopher, M. (2022). *Logistics and supply chain management*. Pearson Uk.

Cohen, J. (1988). Set correlation and contingency tables. *Applied Psychological Measurement*, *12*(4), 425-434.

D'Avanzo, R., Lewinski, H., & Wassenhove, L. N. (2003). The link between supply chain andfinancial performance. *Supply Chain Management Review*, *7*, 40-47.

Fernandes, V. (2012). En quoi l'approche PLS est-elle une méthode a (re)-découvrir pour les chercheurs en management ? *M@n@gement*, *15*(1), 102-123.

Fu, Q., Abdul Rahman, A. A., Jiang, H., Abbas, J., & Comite, U. (2022). Sustainable supply chain and business performance: The impact of strategy, network design, information systems, and organizational structure. *Sustainability*, *14*(3), 1080.

Fugate, B. S., Mentzer, J. T., & Stank, T. P. (2010). Logistics performance : efficiency, effectiveness, and differentiation. *Journal of Business Logistics*, *31*(1), 43-62.

Green, K. W., Whitten, D., & Inman, R. A. (2008). The impact of logistics performance on organizational performance in a supply chain context. Supply Chain Management: An International Journal, 13(4), 317-327.

Hair, J. F. (Éd.). (2017). *A primer on partial least squares structural equation modeling (PLSSEM)* (2nd ed.). Sage.

Helms, M. M., & Dileepan, P. (2005). Transportation issues for supply chain management. In *Business Forum* (Vol. 27, No. 1, p. 8). California State University, Los Angeles, School of Business and Economics.

Hulland, J. (1999). Use of partial least squares (PLS) in strategic management research : A review of four recent studies. *Strategic Management Journal*, *20*(2), 195-204.

Jamaludin, M., Busthomi, H., Gantika, S., Rosid, A., Sunarya, E., & Nur, T. (2022). Market orientation and SCM strategy on SME organizational performances: the mediating effect of market performance. *Cogent Economics & Finance*, *10*(1), 2157117.

Kaufmann, L., & Gaeckler, J. (2015). A structured review of partial least squares in supply chain management research. *Journal of Purchasing and Supply Management*, *21*(4), 259-272.

Krichen, S. (2022). Supply chain management and optimization in transportation logistics. *Advances in Computing and Engineering*, *2*(2), 70-72.

Lenny Koh, S. C., Demirbag, M., Bayraktar, E., Tatoglu, E., & Zaim, S. (2007). The impact of supply chain management practices on performance of SMEs. *Industrial management & data systems*, *107*(1), 103-124.

Li, G., Yang, H., Sun, L., & Sohal, A. S. (2009). The impact of IT implementation on supply chain integration and performance. *International Journal of Production Economics*, *120*(1), 125-138.

Mamun, M. (2023). SCM and SME performance in Australia: the mediating role of HRM practices. *International Journal of Manpower*.

McCormack, K., Bronzo Ladeira, M., & Paulo Valadares de Oliveira, M. (2008). Supply chain maturity and performance in Brazil. *Supply Chain Management: An International Journal*, *13*(4), 272-282.

Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D., & Zacharia, Z. G. (2001). Defining supply chain management. *Journal of Business logistics*, *22*(2), 1-25.

Monjur, M. E. I., & Akon, T. (2023). Supply Chain Management and Logistics: How Important Interconnection Is for Business Success. *Open Journal of Business and Management*, *11*(5), 2505-2524.

Mwangangi, P. W. (2016). Influence Of Logistics Management On Performance Of Manufacturing Firms In Kenya. Jomo Kenyatta University of Agriculture and Technology.

Nascimento, N. M., Cabero, M. M. M., & Valentim, M. L. P. (2021). Information and Document Flows in Organizational Environments. In *Role of Information Science in a Complex Society* (pp. 202-223). IGI Global.

Nimeh, H. A., Abdallah, A. B., & Sweis, R. (2018). Lean supply chain management practices and performance: empirical evidence from manufacturing companies. *International Journal of Supply Chain Management*, *7*(1), 1-15.

Pejić Bach, M., Klinčar, A., Aleksić, A., Rašić Jelavić, S., & Zeqiri, J. (2023). Supply Chain Management Maturity and Business Performance: The Balanced Scorecard Perspective. *Applied Sciences*, *13*(4), 2065.

Qian, H., Guo, H., Sun, B., & Wang, Y. (2022). Integrated inventory and transportation management with stochastic demands: A scenario-based economic model predictive control approach. *Expert Systems with Applications*, *202*, 117156.

Rathnasinghe, A. P., Wijewickrama, M. K. C. S., Kulatunga, U., & Jayasena, H. S. (2020). Integration of BIM and Construction Supply Chain Through Supply Chain Management; An Information Flow Model. In *ICSBE 2018: Proceedings of the 9th International Conference on Sustainable Built Environment* (pp. 604-614). Springer Singapore.

Richey, R. G., Roath, A. S., Adams, F. G., & Wieland, A. (2022). A responsiveness view of logistics and supply chain management. *Journal of Business Logistics*, *43*(1), 62-91.

Rini, P. L., Kumar, A., & Sutanto, A. (2023). Supply Chain Management Practices and Supply Chain Integration on Organizational Performance: The Mediation Role of Competitive Capabilities. *Journal of Management and Business Insight*, *1*(1), 52-65.

Sánchez, A., & Pérez, M. (2005). Supply chain flexibility and firm performance : A conceptual model and empirical study in the automotive industry. *International Journal of Operations & Production Management*, *25*(7), 681-700.

Tenenhaus, M., Vinzi, V. E., Chatelin, Y.-M., & Lauro, C. (2005). PLS path modeling. *Computational Statistics & Data Analysis*, *48*(1), 159-205.

Truong, H. Q., Sameiro, M., Fernandes, A. C., Sampaio, P., Duong, B. A. T., Duong, H. H., & Vilhenac, E. (2017). Supply chain management practices and firms' operational performance. *International Journal of Quality & Reliability Management*, *34*(2), 176-193.

Verma, K., Chahal, A., Kumar, V., Nayak, P., & Singh, P. (2020, March). Automated order management using robotic process automation. In *Proceedings of the international conference on innovative computing & communications (ICICC)*.

Wisner, J. D. (2003). A Structural Equation Model Of Supply Chain Management Strategies And Firm Performance. *Journal of Business Logistics*, *24*(1), 1-26.

Yeung, A. C. L. (2008). Strategic supply management, quality initiatives, and organizational performance. *Journal of Operations Management*, *26*(4), 490-502.

Yoshitake, H., Kazama, Y., Kamoshida, R., & Kondou, M. (2021). *U.S. Patent Application No. 16/074*, *140*.