“How does adopting sustainable supply chain quality management improve corporate financial performance? A transaction cost perspective”

AUTHORS	Anass Touil Aziz Babounia Nabil El Hamidi

ARTICLE INFO	Anass Touil, Aziz Babounia and Nabil El Hamidi (2024). How does adopting sustainable supply chain quality management improve corporate financial performance? A transaction cost perspective. *Investment Management and Financial Innovations*, *21*(3), 170-186. doi:10.21511/imfi.21(3).2024.15
DOI	http://dx.doi.org/10.21511/imfi.21(3).2024.15
RELEASED ON	Monday, 05 August 2024
RECEIVED ON	Saturday, 25 May 2024
ACCEPTED ON	Friday, 19 July 2024

JOURNAL	"Investment Management and Financial Innovations"
ISSN PRINT	1810-4967
ISSN ONLINE	1812-9358
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine
www.businessperspectives.org

Anass Touil (Morocco), **Aziz Babounia** (Morocco), **Nabil El Hamidi** (Morocco)

HOW DOES ADOPTING SUSTAINABLE SUPPLY CHAIN QUALITY MANAGEMENT IMPROVE CORPORATE FINANCIAL PERFORMANCE? A TRANSACTION COST PERSPECTIVE

Received on: 25th of May, 2023
Accepted on: 19th of July, 2024
Published on: 5th of August, 2024

Anass Touil, Ph.D. Student, Faculty of National School of Business and Management, Department of Management, Ibn Tofail University, Morocco. (Corresponding author)

Aziz Babounia, Ph.D., Professor, Department of Management, National School of Business and Management, Ibn Tofail University, Morocco.

Nabil El Hamidi, Ph.D., Faculty of Law and Economics, Department of Economics, Cadi Ayyad University, Morocco.

Abstract

This article examines the impact of adopting SSCQM on the financial performance of companies, based on transaction theory. The main objective of this study is to assess how reducing transactional costs through SSCQM, or within its framework, can improve the financial performance of Moroccan companies. The methodology is based on quantitative analysis, using an econometric model (GLM-Gamma) to test the association between SSCQM adoption and financial performance. The results of the study show that various SSCQM-related practices positively affect companies' financial performance. Managing sourcing costs significantly improves profit margins. Contracts focusing on quality and sustainability, and minimizing the risk of non-compliance, also boost financial performance. However, the ability to adapt and respond to regulatory changes shows no significant impact. Optimizing production processes and investing in green technologies are proving to be profitable strategies, with significant improvements in financial performance. Customer engagement and transparency and traceability of operations also have a positive impact. These results suggest that SSCQM practices, such as the adoption of green technologies and transparency policies, are beneficial for companies' financial performance. The originality of the study lies in its approach, which links transaction theory to sustainable supply chain management, an angle little explored in existing literature. The study confirms that SSCQM is an effective strategy for improving corporate financial health by minimizing transactional costs. It recommends integrating SSCQM into companies' management strategies to boost their competitiveness, financial performance and sustainability.

Keywords sustainable supply chain quality management, financial performance, transaction theory, cost management

JEL Classification M11, Q56, L23, G32

Conflict of interest statement:
Author(s) reported no conflict of interest

INTRODUCTION

The integration of sustainability into supply chain operations has become a critical focus, driven by increasing regulatory demands and a surge in consumer expectations for environmentally and socially responsible practices. This shift is transforming the landscape of Supply Chain Management (SCM), compelling businesses to expand their strategies beyond the traditional goals of minimizing transaction costs related to procurement, logistics, and production. Thus, the adoption of SSCQM (Sustainable Supply Chain Quality Management) appears to be an important lever for improving companies' financial performance. From the perspective of Transaction Cost Theory (TCT), the primary objective of SSCQM should be to reduce transaction costs, which include expenses incurred from negotiating and enforcing agreements, managing supply relationships, and handling the

http://dx.doi.org/10.21511/imfi.21(3).2024.15

logistical intricacies of the supply chain. The integration of environmental and social responsibilities introduces additional layers of complexity, necessitating a reevaluation of how these factors align with economic outcomes.

The nuanced challenge here lies in embedding sustainable practices into SSCQM in a manner that optimizes, rather than merely increases, overall costs. This requires a strategic overhaul whereby sustainability becomes a core component of SSCQM strategies, potentially transforming initial higher costs into long-term operational savings and competitive advantages. This approach challenges the foundations of transaction cost economics by introducing environmental and social dimensions previously unaccounted for in traditional transaction costs analyses. This development highlights an important area of study: the integration of SSCQM practices can lead to an overall reduction in transaction costs for companies and improve financial performance. It is important to address this issue to understand the potential of sustainable practices to generate economic value while respecting environmental and social responsibilities. The goal is to evaluate whether these practices can streamline operations, reduce waste, improve supplier relationships, and ultimately lead to cost savings that offset the initial investments in sustainability, thereby enhancing the financial performance of companies that adopt SSCQM.

1. LITERATURE REVIEW

Sustainability in modern supply chains is important due to rising consumer demand for eco-friendly practices (Touil et al., 2023). Integrating sustainable practices can boost long-term profitability by reducing waste, enhancing resource efficiency, and mitigating environmental regulation risks. Bastas and Liyanage (2018) discuss SSCQM's role in promoting organizational sustainability through a model combining ISO9001 and supply chain management principles. This model aids in improving sustainable management maturity and risk assessment. The application of transaction cost theory to SSCQM integrates environmental, social, and economic aspects, focusing on minimizing environmental impact while maintaining business efficiency. The strategies include selecting sustainable suppliers, managing risks and compliance, optimizing resources, and improving stakeholder relations to enhance financial performance.

The importance of supplier selection within the SSCQM framework can be demonstrated by transaction cost theory, established by Coase (1992) and developed by Williamson (1985). This theory suggests that decisions between internal production and outsourcing depend on transaction costs, such as search, contract, and coordination costs, guiding companies towards sustainable supplier selection that minimizes costs. Building on this, Spekman et al. (1998) explore relational contracts and vertical integration, emphasizing how choosing suppliers engaged in sustainable practices can enhance long-term relationships and improve environmental and financial performance. Additionally, Lee and Turban (2001) highlight the importance of trust and reliability in buyer-supplier relationships, noting that strong trust foundations can reduce monitoring and uncertainty costs.

Expanding on the selection criteria, Sukati et al. (2013) recommend the rigorous selection of suppliers meeting sustainability standards to enhance supply chain resilience and overall performance. Hofstetter (2018) underscores the integration of sustainability criteria into procurement strategies to improve environmental and social performance. Further emphasizing contractual relationships, Poppo and Zenger (2002) discuss the role of contractual governance in optimizing buyer-supplier relationships, reducing opportunistic risks, and minimizing transaction costs. In line with this, Selviaridis and Spring (2007) advocate for performance-based contracts to align suppliers' incentives with sustainability goals, thereby improving product quality and operational efficiency while reducing waste. Adding to this perspective, Khokhar et al. (2022) emphasize that performance and quality-focused contracts, with clear sustainability expectations, effectively align supplier incentives with company goals. Glas et al. (2018) analyze performance-based contracts as tools for cost reduction, demonstrating that well-structured contracts minimize non-compliance risks and foster better collaboration among stakeholders.

Adopting transaction cost theory, SSCQM contracts should include strict environmental and social clauses, despite short-term costs, to build a sustainable supply chain. Porter and Linde (1995) argue that well-designed regulations stimulate innovation and improve financial performance by clarifying expectations and simplifying market interactions. Similarly, Shrivastava (1995) adds that proactive compliance fosters beneficial innovations, enhancing efficiency. Berrone et al. (2013) confirm that regulatory compliance boosts productivity and financial performance. Building on this, Laguir et al. (2019) and Manavalan and Jayakrishna (2019) highlight that sustainability management must assess social, environmental, and economic impacts to avoid long-term financial losses. Pettit et al. (2019) emphasize integrating sustainability into corporate strategies to mitigate non-compliance risks, such as fines or reputational damage. Vaduva et al. (2016) see risk management as fostering integrity and reducing non-compliance costs, which adds value to processes. Furthermore, Carter and Rogers (2008) show that supply chain collaboration enhances sustainability and financial performance, demonstrating the economic benefits of compliance.

Adding to the discussion on risks, Shahsavari and Akbari (2018) discuss costs associated with environmental risks like deforestation and pollution, including fines and reputational damage. Pagell and Shevchenko (2014) show that integrating sustainability into supply chain management reduces costs and improves reputation, boosting economic performance. In contrast, Halldórsson et al. (2009) warn against superficial sustainability practices like "greenwashing," which can lead to high long-term costs from legal disputes and loss of credibility. Thus, genuine sustainability integration is essential to minimize costs and optimize financial performance. Rigorous compliance and true sustainability integration are important for reducing these costs and improving economic performance in an increasingly environmentally and socially aware market.

According to Porter and Linde (1995), well-structured environmental regulations can encourage innovation and strengthen corporate financial performance, known as the "Porter Hypothesis." These regulations reduce transaction costs by clarifying regulatory expectations and simplifying market interactions, thus lowering compliance expenses and regulatory uncertainty. Complementing this idea, Shrivastava (1995) shows that proactive compliance with regulations can lead to profitable innovations that enhance operational efficiency. Akhigbe and Worlu (2020) highlight that process optimization, clean technologies, and efficient e-procurement systems can reduce costs and improve financial performance through better resource management. Johl and Toha (2021) study the innovations in waste management, noting that greener production practices reduce operational and transaction costs. Marković and Mihić (2022) argue that continuous improvement and adopting emerging technologies are important for competitiveness, minimizing costs associated with obsolescence and inefficiency.

King and Lenox (2002) demonstrate that green technologies reduce operational costs and improve market competitiveness by minimizing reputational risks and legal liabilities. Sahoo et al. (2023) add that innovative resource management is essential for the effective implementation of green technologies, leading to cost savings and improved financial performance. Hart and Dowell (2011) link proactive green management to significant financial benefits, including improved reputation and efficiency. Marín-Vinuesa et al. (2018) emphasize the importance of R&D investment in clean technologies to maintain competitiveness and improve profitability through energy efficiency and carbon footprint reduction. The synergy between green technologies and sustainable supply chain management reduces environmental impact and boosts financial performance through enhanced operational efficiency and reduced transaction costs, offering a sustainable competitive advantage.

Hennig-Thurau and Klee (1997) demonstrated that high relationship quality, including customer satisfaction, boosts customer loyalty and financial performance by stabilizing interactions and reducing acquisition costs. Ansari and Kant (2017) emphasize sustainability in the supply chain to enhance profit and competitiveness while meeting stakeholder expectations. Nyaga and Whipple (2011) argue that strong customer relationships reduce friction and uncertainty, lowering costs related to agreements and litigation. Leuschner et al. (2013) and Seuring and Muller (2008) highlight the importance of supply chain integration and transparency for sustainable performance, aligning operations with sustainability objectives and improving efficiency.

http://dx.doi.org/10.21511/imfi.21(3).2024.15

Hoejmose et al. (2013) discuss sustainable differentiation strategies that enable price premiums, while Graham et al. (2018) stress incorporating sustainability in business strategies to strengthen customer engagement and reduce transaction costs. Gardner et al. (2019) emphasize transparency in enhancing sustainability practices and compliance, reducing risks, and boosting stakeholder confidence. Grimard et al. (2017) highlight online databases and traceability platforms for increased supply chain visibility and financial performance. Paliwal et al. (2020) discuss blockchain's role in improving transparency and creating resilient supply networks. Abdel-Basset et al. (2020) explore technological innovations that enhance compliance with environmental and social standards, reducing risks and transaction costs.

Thus, the literature emphasizes the importance of integrating sustainable practices into modern supply chains, which can enhance profitability by reducing waste, increasing resource efficiency, and mitigating risks related to environmental regulations. Models combining quality management and supply chain management demonstrate that selecting sustainable suppliers and performance-based contracts are important for optimizing financial performance. In this context, the objective of this study is to evaluate how reducing transaction costs through the adoption of SSCQM can improve the financial performance of Moroccan companies. Based on the literature review, the following research hypotheses can be posited:

H1: Optimization of transaction costs related to supplier selection and management has a positive impact on the financial performance of companies adopting SSCQM.

H1a: Minimizing supplier search and selection costs in SSCQM has a positive impact on the financial performance of the company.

H1b: SSCQM's quality and environmental performance-based supplier contracts have a positive impact on the company's financial performance.

H2: The reduction of transaction costs through effective economic risk and compliance management has a positive impact on the financial performance of companies adopting SSCQM.

H2a: Reducing non-compliance risks in SSCQM has a positive impact on the financial performance of the company.

H2b: Adaptability and response to regulations in the SSCQM have a positive impact on the company's financial performance.

H3: Reducing transaction costs by improving resource efficiency and reducing waste has a positive impact on the financial performance of companies adopting SSCQM.

H3a: Production process optimization in SSCQM has a positive impact on the financial performance of the company.

H3b: Strategic investment in green technologies in the SSCQM has a positive impact on the company's financial performance.

H4: Reducing transaction costs by strengthening stakeholder relations has a positive impact on the financial performance of companies adopting SSCQM.

H4a: Customer involvement and satisfaction in SSCQM has a positive impact on company's financial performance.

H4b: Transparency and traceability in SSCQM have a positive impact on the company's financial performance.

2. METHODOLOGY

2.1. The model

As part of the research on SSCQM, Transaction Cost Theory was used to examine how the integration of environmental, social and economic aspects can improve supply chain management. SSCQM aims to reduce environmental impact while maintaining business efficiency and economic competitiveness. This theoretical approach analyzes the costs associated with economic exchanges and contract governance to see how strategies to reduce transactional costs by adopting SSCQM could improve companies' financial performance. Strategies include sustainable supplier

Table 1. Hypotheses and the associated variables

Hypotheses	Variables	Direction of correlation
H1a	Minimization of Research and Selection Costs (CMSR)	Positive
H1b	Quality and Environmental Performance Contracts (EQPC)	Positive
H2a	Non-Compliance Risk Reduction (RRNC)	Positive
H2b	Adaptability and Response to Regulation (AARR)	Positive
H3a	Production Process Optimization (PPOP)	Positive
H3b	Strategic Investment in Green Technologies (SGIT)	Positive
H4a	Customer Commitment and Satisfaction (CESC)	Positive
H4b	Transparency and Traceability (TTRA)	Positive

selection, proactive risk and compliance management to avoid penalties, resource optimization to reduce raw material and waste costs, and improved stakeholder relations to reduce conflict and increase customer loyalty. The econometric model is given as follows:

$$FPFC = \beta_0 + \beta_1 \cdot CMSR + \beta_2 \cdot EQPC + \beta_3 \cdot RRNC + \beta_4 \cdot AARR + \beta_5 \cdot PPOP + \beta_6 \cdot SGIT + \beta_7 \cdot CESC + \beta_8 \cdot TTRA + \varepsilon, \quad (1)$$

where *FPFC* stands for financial performance of the company. *CMSR* refers to the minimization of search and selection costs. *EQPC* stands for quality and environmental performance contracts, *RRNC* refers to the reduction of risks associated with non-compliance, *AARR* indicates adaptability and response to regulations, *PPOP* represents optimization of production processes, *SGIT* is for strategic investment in green technologies, *CESC* is for customer commitment and satisfaction, *TTRA* indicates transparency and traceability. Table 1 presents the hypotheses, the variables involved and the expected direction of correlation between each variable and the company's financial performance.

2.2. Data

The empirical study of the impact of SSCQM adoption on corporate financial performance in the light of transaction theory followed a methodical approach to questionnaire construction, inspired by the recommendations of Hunt et al. (1982). This approach began with a pre-test conducted on a small group of companies that adopt to identify and correct any difficulties respondents might encounter, thus ensuring the clarity and relevance of the questions asked. The questionnaire validation process began by examining an initial version to ensure that it met the research objectives. A sub-group of 20 Moroccan companies was then involved in a pilot test to further refine the questionnaire by clarifying the study objectives and questions. Individual interviews after data collection were essential to obtain feedback on the comprehensibility of the instructions and clarity of the questions, and to assess the appropriate length of the questionnaire.

Data were collected by distributing 1,000 printed questionnaires, targeting companies (mainly SMEs) adopting the SSCQM. This phase was marked by logistical challenges, but succeeded in achieving a response rate of 28.6%, with 286 questionnaires adequately completed (Table 2). Sensitive questions particularly influenced this low participation rate.

2.3. Variables construction

Convergent validity, Cronbach's alpha and composite reliability (Table 3) are indices used to assess the internal consistency of scale items, generally with a threshold of 0.7 for Cronbach's alpha and composite reliability and 0.5 for convergent validity. Average Variance Extracted (AVE) measures the variance explained by a theoretical construct versus that due to error, often with a threshold of 0.7 to confirm convergent validity.

Each variable is initially made up of six items, of which only those with convergent validity above 0.5 are retained. The indicators used to assess var-

Table 2. Questionnaire response rate

Distributed	Unreturned	Returned	Valid	Invalid	Response rate
1000	327	673	286	387	28.6%

http://dx.doi.org/10.21511/imfi.21(3).2024.15

Table 3. Results of Confirmatory Factor Analysis (convergent validity, Cronbach's alpha, reliability composite and AVE)

Variable	Convergent validity	Cronbach's alpha	Composite reliability	AVE
Cost savings in supplier search and selection		**0,86736**	**0,79008**	**0,62156**
CMSR 2	0,877796			
CMSR 3	0,613938			
CMSR 4	0,745541			
CMSR 5	0,793254			
Contracts with suppliers based on quality and environmental performance		**0,79690**	**0,80237**	**0,87597**
EQPC 1	0,774668			
EQPC 2	0,685318			
EQPC 3	0,736363			
EQPC 4	0,605787			
EQPC 6	0,827184			
Reducing the risk of non-compliance		**0,80046**	**0,87961**	**0,78211**
RRNC 1	0,565443			
RRNC 2	0,765655			
RRNC 3	0,631328			
RRNC 6	0,714419			
Adaptability and response to regulations		**0,88327**	**0,75161**	**0,87251**
AARR 1	0,523548			
AARR 2	0,782998			
AARR 3	0,734530			
Optimizing production processes		**0,79321**	**0,80447**	**0,75865**
OPPP 1	0,532955			
OPPP 3	0,729711			
OPPP 4	0,614846			
OPPP 5	0,817952			
Strategic investment in green technologies		**0,82891**	**0,87512**	**0,71687**
SGIT 1	0,545431			
SGIT 4	0,754553			
SGIT 5	0,609110			
Commitment and customer satisfaction		**0,72476**	**0,89637**	**0,78286**
CESC 1	0,779977			
CESC 4	0,795165			
CESC 5	0,569196			
Transparency and traceability		**0,85243**	**0,72892**	**0,74217**
TTRA 1	0,804764			
TTRA 2	0,606476			
TTRA 4	0,501469			

ious aspects of performance provide a coherent representation of the effectiveness of the selected measures. The items demonstrate good convergent validity and internal consistency across various aspects such as cost reduction, quality and environmental performance management, and risk mitigation. This strength underlines the ability of the measures to accurately capture the targeted concepts, which are essential for assessing the impact of SSCQM on corporate financial performance. The results also confirm the reliability of the constructs used in the study, which is important for reaching robust conclusions.

Discriminant validity (Table 4) is important in Confirmatory Factor Analysis (CFA) to ensure that each construct measures a unique concept. It is assessed by comparing the variance explained by a construct (via Average Variance Extracted, AVE) with the shared variance (squared correlations between constructs). An AVE greater than the correlations confirms that the construct is distinct and makes a unique contribution to the study. For a variable to display good discriminant validity, its AVE must be greater than the squared correlations with all other variables, thus affirming that each variable makes a unique contribution to the study.

Table 4. Results of Confirmatory Factor Analysis (discriminant validity)

Variable	1	2	3	4	5	6	7	8
FPFR(1)	0,788							
CMSR(2)	0,091	0,935						
EQPC(3)	0,079	–0,003	0,884					
RRNC(4)	–0,005	0,006	0,032	0,934				
AARR(5)	–0,050	0,067	0,059	0,041	0,871			
PPOP(6)	–0,094	–0,036	–0,013	0,044	–0,024	0,846		
SGIT(7)	0,000	–0,018	–0,070	0,018	0,118	0,056	0,884	
CESC(8)	–0,029	–0,024	0,062	0,030	–0,011	0,009	0,012	0,861

The off-diagonal values, indicating the squared correlations between the variables, are all lower than the AVE values on the diagonal. This demonstrates a clear distinction between the variables, each measuring specific, non-redundant aspects. After item selection, principal component analysis (PCA) was used to reduce the complexity of the data and identify the main components of the explanatory variables. This method simplified the transformation of qualitative concepts into quantifiable variables, applying PCA individually to each explanatory variable.

2.4. Data analysis and choice of econometric method

Heteroscedasticity can make inferences about coefficients imprecise, as OLS estimators are not the best in this context. To detect heteroscedasticity, the Breusch-Pagan-Godfrey test (Table 5) is used, analyzing whether the variances of the errors are related to the explanatory variables. This test includes a regression of the squares of the residuals on the independent variables to identify non-constant variations in variance.

Table 5. Heteroskedasticity test: Breusch-Pagan-Godfrey

Tests		Probability	
F-statistic	5.472206	Prob. *F*(8,277)	0.0000
Obs**R*-squared	39.03142	Prob. Chi-squared(8)	0.0000
Scaled explained SS	59.96869	Prob. Chi-squared(8)	0.0000

The results of the Breusch-Pagan-Godfrey heteroscedasticity test indicate the presence of heteroscedasticity. With an *F*-statistic of 5.472 and an extremely low probability, the hypothesis of homoscedasticity is rejected, confirming that the error variances are not constant. The Obs*R-squared of 39.031 and the scaled explained SS of 59.968, both with probabilities close to zero, reinforce this conclusion. Techniques such as robust least squares and generalized linear models are recommended to remedy this.

The specification of an econometric model is critical to ensure that conclusions about causal relationships are valid and reliable. It includes the appropriate selection of variables and functional form to reflect economic reality. The Ramsey or RESET test (Table 6) assesses potential specification errors, such as the omission of important variables or functional form errors.

Table 6. Ramsey RESET test for OLS

Specification: FPFR C CMSR EQPC RRNC AARR PPOP SGIT CESC TTRA			
Omitted variables: squares of fitted values			
	Value	**df**	**Probability**
t-statistic	5.646196	272	0.0000
F-statistic	31.87953	(1, 272)	0.0000
Likelihood ratio	31.69717	1	0.0000

The results of Ramsey's RESET test show significant evidence of problems in the initial model specification. The high t-statistic, *F*-statistic and likelihood ratio values suggest that important variables may have been omitted, or that the functional form chosen is not adequate. These elements underline the need to reassess and possibly modify the model specification to better reflect economic reality and ensure reliable conclusions. The Ramsey test revealed shortcomings in the econometric model specification, including the omission of important variables and errors in the functional form. To improve the precision and robustness of the estimates of corporate financial performance, control variables will be incorporated. These additions will better explain the variability of the dependent variable and minimize potential biases, thus strengthening the model specification.

 http://dx.doi.org/10.21511/imfi.21(3).2024.15

Control variables introduced to refine the econometric model include company size (CSIZ), measured by the total number of employees or total assets. Company age (CAGE) is calculated from the number of years since inception. Capital structure (CSTR) is represented by the debt ratio, indicating the proportion of debt to total assets. Finally, the level of technology (TLVL) is defined by the automation ratio, which calculates the proportion of automated processes, suggesting efficiency and innovation within the company. To compare different econometric model specifications, criteria's such as the Akaike Information Criterion (AIC) and the Schwarz Criterion (BIC) are used, which assess goodness of fit and model complexity. These criteria help avoid over-fitting and promote model generalizability. BIC was chosen for its ability to penalize models according to the number of variables, preferring simpler, more robust models. By exploring different model combinations of the four control variables (CSIZ, CAGE, CSTR, TLVL), 15 possible configurations are generated, ranging from models with a single variable to those combining all four. The BIC was used to identify the optimal combination of variables that balances simplicity and explanatory power relative to corporate financial performance. The results are presented in Table 7.

Table 7. Choice of control variables

Combinations of control variables	Schwarz criterion (BIC)
CSIZ	–1,16362705
CAGE	–1,19604019
CSTR	–1,19808362
TLVL	–1,67286744
CSIZ, CAGE	–1,19061079
CSIZ, CSTR	–1,54882031
CSIZ, TLVL	–1,17075948
CAGE, CSTR	–1,44335851
CAGE, TLVL	–1,24502628
CSTR, TLVL*	–1,92206088*
CSIZ, CAGE, CSTR	–1,36123356
CSIZ, CAGE, TLVL	–1,47282414
CSIZ, CSTR, TLVL	–1,16131728
CAGE, CSTR, TLVL	–1,81960502
CSIZ, CAGE, CSTR, TLVL	–1,26826398

Note: * The model with the optimal specification (minimal BIC).

Table 7 reveals that the "CSTR, TLVL" combination has the lowest Schwarz criterion (BIC) value at -1.9220, indicating that it offers the best balance between goodness of fit and model simplicity of all the configurations tested. This combination is therefore identified as the optimal specification for the econometric model.

Analysis of the Ramsey RESET test (Table 8) for the model including the "CSTR" and "TLVL" variables shows an improvement in indicators compared with previous configurations without these variables. Initially, the model had a significant specification problem, with high t-statistics and very low probabilities for the F and likelihood statistics, suggesting the omission of important variables. After integration of "CSTR" and "TLVL", there is a noticeable reduction in the t-statistic to 1.998 and a slight improvement in the probabilities, indicating a less severe, albeit persistent, specification problem. This improvement, albeit modest, means that the addition of these variables has partially alleviated the initial problems. However, shortcomings remain, highlighting the possible need to add further variables or modify the functional form to better reflect underlying dynamics.

Table 8. Ramsey RESET test after adding control variables

Specification: FPFR C CMSR EQPC RRNC AARR PPOP SGIT CESC TTRA CSTR TLVL			
Omitted variables: squares of fitted values			
	Value	**df**	**Probability**
t-statistic	1.998926	274	0.0466
F-statistic	3.995704	(1, 274)	0.0466
Likelihood ratio	4.140580	1	0.0419

Understanding the distribution followed by the dependent variable is important for selecting the optimal econometric model and guaranteeing reliable results. Accurate identification of this distribution enables efficient, unbiased estimates; the model parameters will converge to the true values with minimized variance as the sample size increases. If the distribution is normal, classical linear models via OLS method are generally sufficient and reliable. However, anomalies such as skewness or leptokurticity in economic and financial data often require adaptations in the model to avoid misinterpretations and statistical errors. This can affect hypothesis testing and the evaluation of confidence intervals. Figure 1 illustrates these concepts: on the right, a QQ plot compares the quantiles of the data with those of a theoretical normal distribution-data aligned on the straight

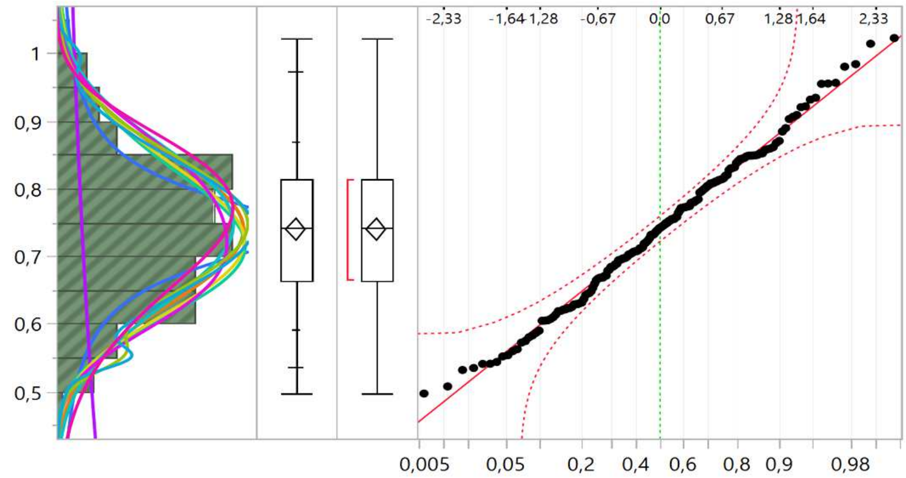

Figure 1. Distribution of the dependent variable

line would indicate a normal distribution. The red dotted lines show confidence intervals. On the left, different probability density functions for various distributions show the probability of variable values; the different colors help to visualize comparisons between observed and theoretical distributions.

The deviations observed on the QQ plot, especially at the extremes, suggest specific characteristics of the distribution of the dependent variable. For example, if the points are closer to the Gamma curve than to the others, this would indicate that the Gamma distribution might better represent the data. However, the adjusted information criterion and log likelihood values (Table 9) show that the Gamma distribution is the most likely for the data, with lower AIC and BIC scores for Gamma. This result supports the idea that Gamma is the most appropriate distribution to describe the dependent variable in this study.

The PP plot (Probability-Probability plot) in Figure 2 is a tool used to check the fit between a set of data and a specific theoretical distribution. It plots the cumulative probabilities of the observed data against those of the theoretical distribution; an alignment of points on the diagonal indicates a good match with the intended distribution. The PP plot in Figure 2 shows that the Gamma distribution could be appropriate for the data, as shown by the black dots (empirical distribution function) that closely follow the red dotted line (Gamma theoretical distribution function), especially in the center of the distribution. This alignment suggests that the observations of the dependent variable conform to a Gamma distribution.

Although there are some deviations at the extremes, which is fairly typical in real distributions due to the presence of extreme values or slight skewness, the data set broadly corresponds to the theoretical Gamma distribution function.

Table 9. Comparison of distributions

Distribution		AICc	Corrected AICc	BIC	–2 * Log–likelihood
Gamma		–266,259	0,3253	–260,047	–270,331
Normal		–265,933	0,2763	–259,721	–270,0046
Log-normal		–264,771	0,1546	–258,559	–268,8424
Student's t		–263,863	0,0982	–254,582	–270,0075
SHASH		–263,704	0,0907	–251,378	–271,9454
Normal mixture of order 2		–261,483	0,0299	–246,139	–271,8473
Johnson's Sb		–260,745	0,0207	–248,420	–268,9867
Normal mixture of order 3		–256,643	0,0027	–232,398	–273,5322
Weibull		–255,749	0,0017	–249,537	–259,8206
Cauchy		–195,239	0	–189,027	–199,3109
Exponential		240,6993	0	243,8173	238,67565

http://dx.doi.org/10.21511/imfi.21(3).2024.15

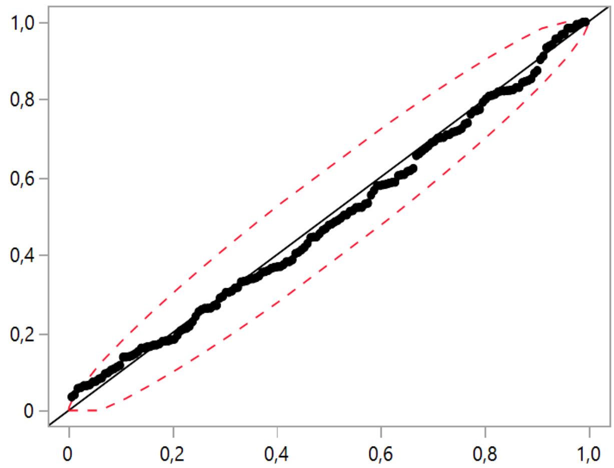

Figure 2. PP plot

The use of generalized linear models is particularly appropriate for addressing problems such as heteroscedasticity and the non-normality of the dependent variable. GLMs can be used to model dependent variables with different distributions from the exponential family, including Gamma, which fits well with the data indicating non-normality. These models also handle heteroscedasticity effectively; for a Gamma distribution, for example, the GLM link function can naturally incorporate a mean-dependent variance, which is ideal for the data showing variable variances. GLMs can include dispersion terms to better match the observed variance, increasing the precision of estimates and the validity of statistical conclusions. These features make GLMs extremely useful for this analysis, offering the flexibility needed to deal with the specificities of the data. In this sense, the GLM with a Gamma theoretical distribution function is adopted and the specification of the augmented model given as follows:

$$\begin{aligned} FPFC &= \beta_0 + \beta_1 \cdot CMSR + \beta_2 \cdot EQPC \\ &+ \beta_3 \cdot RRNC + \beta_4 \cdot AARR + \beta_5 \cdot PPOP \\ &+ \beta_6 \cdot SGIT + \beta_7 \cdot CESC + \beta_8 \cdot TTRA \\ &+ \beta_9 \cdot CSTR + \beta_{10} \cdot TLVL + \varepsilon, \end{aligned} \qquad (2)$$

3. RESULTS

The study used OLS to analyze and explore potential problems in the data, including heteroscedasticity and misspecifications flagged by the Ramsey test. These problems suggested functional form errors or the omission of important variables. To improve the model, control variables were introduced, allowing a more complete capture of the factors influencing financial performance. Different combinations of these variables was evaluated using the AIC and BIC criteria to determine the most appropriate specification, with an emphasis on simplicity and optimal fit. However, the non-normality of the dependent variable persisted, as shown by the descriptive analyses and normality tests, including the Jarque-Bera test, as well as the deviations observed on the QQ plot and PP plot. Consequently, this study opted for a generalized linear model (GLM) with a Gamma distribution, which offers the flexibility needed to handle asymmetric distributions and heavy ends.

Table 10. Ramsey RESET for GLM regression

Specification: FPFR C CMSR EQPC RRNC AARR PPOP SGIT CESC TTRA CSTR TLVL			
Omitted variables: squares of fitted values			
	Value	**df**	**Probability**
t-statistic	0.6240	274	0.4669
F-statistic	1.2385	(1, 274)	0.4665
Likelihood ratio	1.2096	1	0.4568

The t-statistic of 0.6240 with a probability of 0.4669, as well as similar values for the *F*-statistic and the likelihood ratio, indicate that the null hypothesis of no specification problems cannot be rejected, confirming that the model with the control variables is well specified (Table 10). These results validate the use of a GLM with Gamma distribution, and illustrate that the model effectively captures the influences on financial performance. The Variance Inflation Factor (VIF) is used to dwarf the multicollinearity. A VIF greater than

5 indicates problematic multicollinearity, which may require a re-evaluation of the model specification. For the GLM model with Gamma distribution, the calculated VIFs (Table 11) are all below 5, suggesting low multicollinearity among the independent variables. This indicates that each variable contributes uniquely to the model, without significant redundancy, which is beneficial for the statistical integrity.

Table 11. Variance Inflation Factors (VIF) for the GLM-Gamma regression

Variable	Coefficient variance	Uncentered VIF	Centered VIF
C	0.012516	227.6290	NA
CMSR	0.000153	25.66603	1.034914
EQPC	0.000177	28.42936	1.025454
RRNC	0.000111	16.58360	1.053929
AARR	0.000109	18.35459	1.007777
PPOP	0.000159	25.55167	1.039541
SGIT	0.000101	12.15769	1.018903
CESC	0.000102	18.49104	1.033099
TTRA	0.000102	21.28001	1.016199
CSTR	0.006643	38.24239	1.046794
TLVL	0.005676	30.82364	1.029903

This observation gains in importance when compared with the results of the confirmatory factor analysis on discriminant validity, which showed that the variables in the study do indeed measure distinct concepts. The low values of VIF in the GLM-Gamma distribution confirm this statistical independence, supporting the idea that the variables are not only conceptually distinct but also have little or no statistical correlation. This correlation between low multicollinearity and high discriminant validity reinforces the construction of the model, affirming that the variables chosen are appropriate for rigorous and reliable statistical analysis.

Unlike traditional linear models, GLMs do not require residuals to follow a normal distribution. This allows GLMs to model the response variable with various distributions from the exponential family, adapted to the nature of the data. However, analyzing the distribution of the residuals remains important for assessing the adequacy of the model. A mismatch between the observed residuals and the theoretical distribution may indicate a poor specification, potentially leading to biased and inefficient estimates. Examining the residuals also helps to identify outliers or extreme observations that could bias the estimates.

The whisker boxes (Figure 3) show few outliers, which is positive for the GLM-Gamma model designed to handle the skewed distributions typically associated with extreme values. The modest amount of outliers and the slight skewness in the whisker boxes are consistent with the expectations of a Gamma distribution and suggest that this specification is well suited to the data. This finding confirms that the GLM-Gamma model is appropriate and that no major adjustments are required despite small irregularities in the residuals.

For GLMs using the gamma distribution, which is often chosen for data where the variance in-

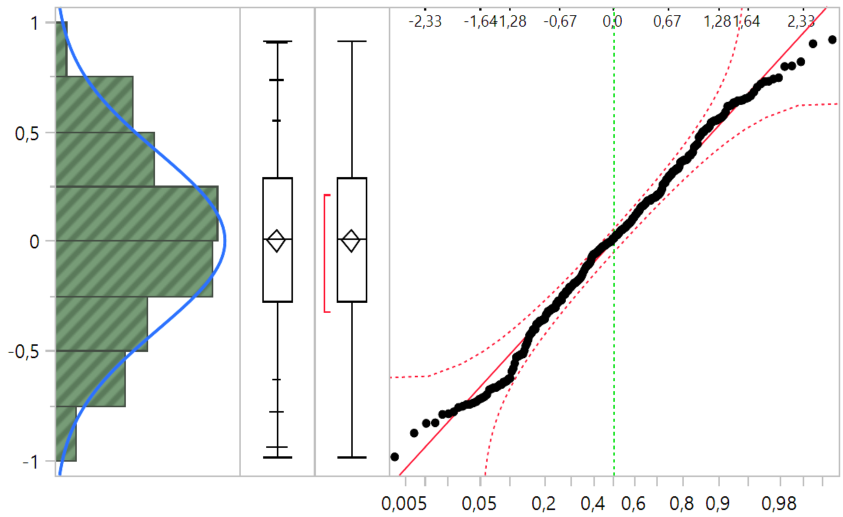

Figure 3. Residual distribution

http://dx.doi.org/10.21511/imfi.21(3).2024.15

creases with the mean, the variance of the errors is modelled in proportion to the mean, offering a natural solution to heteroscedasticity problems. Performing a heteroscedasticity test in this context checks whether this specification is adequate, ensuring that the model's estimates and inferences are reliable. If the test reveals a mismatch, this may indicate that the gamma distribution is unsuitable, requiring an adjustment to the model specification to better reflect the data being analyzed.

Table 12. Heteroscedasticity test: Breusch-Pagan-Godfrey

Tests		Probability	
F-statistic	0.448963	Prob. *F*(10,275)	0.9210
Obs**R*-squared	4.594208	Prob. Chi-squared(10)	0.9166
Scaled explained SS	4.692160	Prob. Chi-squared(10)	0.9108

Analysis of the results of the Breusch-Pagan-Godfrey heteroscedasticity test (Table 12) for the GLM-Gamma model shows an *F*-statistic of 0.45 and p-values above 0.05, indicating an absence of significant heteroscedasticity. This contrasts with the results obtained using the initial OLS regression, where heteroscedasticity was detected. This demonstrates that the Gamma distribution is well suited to the data analyzed, thus validating the choice of specification for the econometric model.

Stability analysis in GLMs is important to the reliability and generalizability of statistical results. It ensures that predictions and statistical inferences such as hypothesis tests and confidence interval estimates remain valid even with variations in the data or modelling. In GLM, stability also verifies that the distribution of the response variable and the link function are appropriate for the data, helping to correctly capture non-linear relationships and manage heteroscedasticity.

The Hat Matrix (Figure 4) is used in linear regression to analyze the influence of observations on model predictions. It projects the observed values onto the predicted ones, and the leverage values indicated by the diagonal elements of this matrix show the impact of an observation on its own prediction. High values suggest a disproportionate influence, which may indicate outliers. For the GLM-Gamma model, most of the leverage values are below a critical threshold, which suggests that the model is generally stable and does not have very influential outliers.

The GLM-Gamma model is used to better handle the non-normality and heteroscedasticity of the data. Various tests were used to confirm the validity of the model. The GLM-Gamma mod-

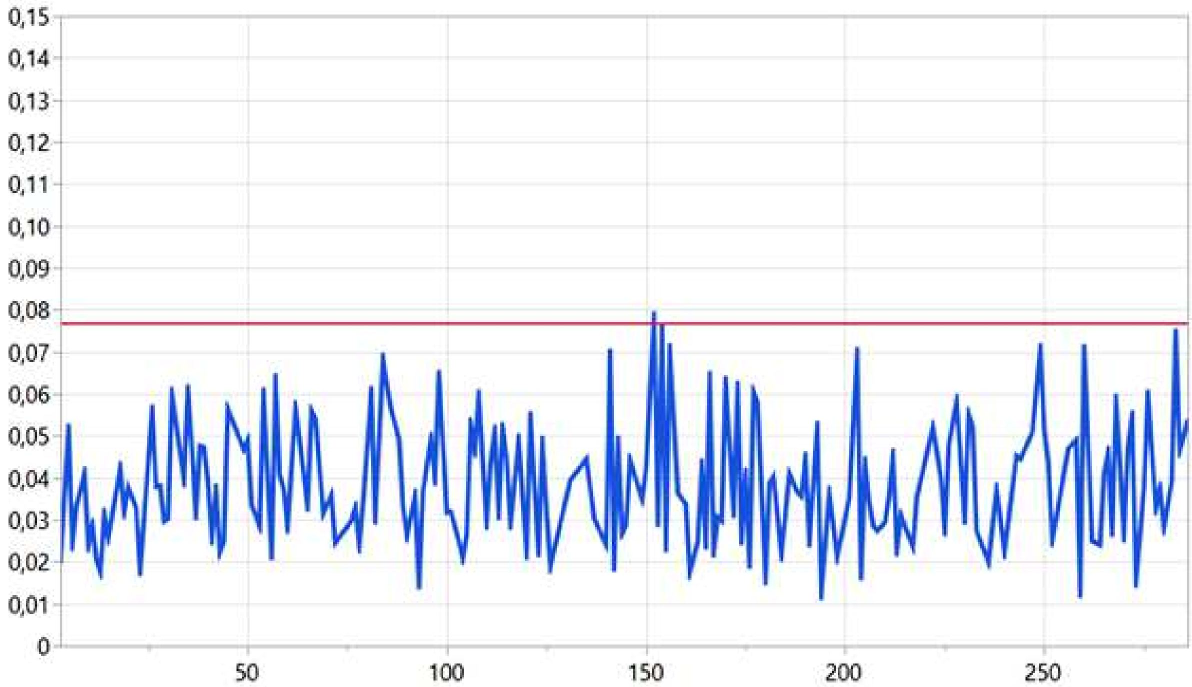

Figure 4. Hat-Matrix

Table 13. GLM-Gamma regression results

Dependent variable: FPFR
Method: generalized linear model (Newton-Raphson/Marquardt steps)
Sample: 1 286
Included observations: 286
Family: Gamma
Dispersion computed using Pearson Chi-squared
Convergence achieved after 254 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. error	z-statistic	Prob.
C	1,808317	0,172357	10,49168	0,0000***
CMSR	2,763768	1,19086	2,320816	0,0210**
EQPC	1,104421	0,420543	2,62618	0,0091***
RRNC	1,054521	0,615996	1,711895	0,0880*
AARR	-0,01047	0,015868	-0,65992	0,5093
PPOP	2,163327	0,80196	2,697549	0,0074***
SGIT	0,112955	0,015119	7,471103	0,0000***
CESC	0,758736	0,215484	3,521078	0,0005***
TTRA	4,030629	2,215394	1,819373	0,0699*
CSTR	0,094253	0,127017	0,742049	0,4587
TLVL	9,083238	4,11228	2,208808	0,0280**

Note: ***Significant at 1%; **significant at 5%; *significant at 10%.

el, applied to the 286 observations in the sample, reached convergence after 254 iterations. The results are given in Table 13.

The CMSR variable displays a significant positive coefficient at the 5% level, confirming hypothesis *H1a*. This highlights the importance of effective management of the costs associated with research and supplier selection in the SSCQM in order to improve companies' profit margins. As regards EQPC, the positive impact on financial performance is also statistically significant at the 1% level. This significance validates hypothesis *H1b*, indicating that commitments to quality and sustainability through targeted contracts in the SSCQM can lead to an improvement in companies' financial results. RRNC also shows a positive impact on financial performance, with a significance level of 10%. This result supports hypothesis *H2a*, suggesting that minimizing the risks of non-compliance in the SSCQM contributes favorably to the financial performance of companies. The AARR variable did not show statistical significance, which indicates that in the model, the SSCQM's ability to adapt and respond to regulatory changes has no direct measurable impact on companies' financial performance, which leads us to reject *H2b*.

PPOP has a significant positive coefficient at the 1% level, which validates *H3a*. Consequently, the optimization of production processes in the SSCQM has a positive and significant impact on the financial performance of companies. SGIT shows a positive and significant coefficient at the 1% level, thus supporting *H3b*. This confirms that investment in green technologies as part of the SSCQM positively and significantly affects companies' financial performance. CESC shows a significant positive coefficient at the 5% level, thus validating *H4a*. Customer commitment and satisfaction in the SSCQM therefore positively and significantly affect companies' financial performance. As for TTRA, with a significant coefficient at 10%, this variable supports hypothesis *H4b*. A major implication of this result is that companies should pay particular attention to the transparency and traceability of their SSCQM operations. This may take the form of the use of technologies to ensure product traceability, or the implementation of transparency policies with regard to commercial practices. The variables CSTR and TLVL, introduced as control variables in the model, offer an additional perspective on companies' financial performance. With regard to CSTR, although this variable is not significant, TLVL has a significant positive influence with a significant coefficient at 5%. This result suggests that the level of automation and technological adoption within companies that adopt the SSCQM has a favorable impact on their financial performance.

http://dx.doi.org/10.21511/imfi.21(3).2024.15

4. DISCUSSION OF RESULTS AND RECOMMENDATIONS

The SSCQM approach is a key strategic lever to improve the financial performance of companies. For Moroccan companies, integrating these principles could lead to better cost management and risk optimization in their supply chains. This integration is supported by Bastas and Liyanage (2018) who propose a diagnostic model combining ISO9001 principles and supply chain management to improve sustainable management maturity and risk assessment. Quality and environmental performance contracts play a important role in improving financial performance, confirming Poppo and Zenger (2002) who show that well-designed contracts can reduce opportunistic risks and limit uncertainty, thus reducing transaction costs. This is also in line with Selviaridis and Spring (2007) who point out that performance-based contracts are essential for aligning supplier incentives with corporate sustainability objectives, thereby contributing to operational efficiency and cost reduction.

Transaction cost theory suggests that costs associated with economic exchanges can be significantly reduced through well-structured contracts and proactive risk management. For Moroccan companies, integrating a rigorous risk management strategy into SSCQM can lead to reduced transaction costs and improved financial stability. This perspective is also supported by Paul Shrivastava (1995) who demonstrate that proactive compliance with regulations can lead to beneficial innovations and increased operational efficiency. The analysis of adaptability and responsiveness to regulations in SSCQM management reveals that this variable does not have a direct and measurable impact on financial performance. This can be explained by the fact that Moroccan sustainability regulations are not particularly developed or restrictive. However, as suggested by Porter and Linde (1995), aligning practices with international sustainability standards, especially for exporting companies, can create international opportunities and improve economic efficiency.

Process optimization has a significant impact on the financial performance of companies. For Moroccan companies, integrating process optimization strategies into SSCQM can not only reduce transactional costs but also improve profitability by minimizing waste and inefficiencies. This is consistent with Marín-Vinuesa et al. (2018) and Sahoo et al. (2023) who observe that investments in green technologies directly increase profitability by improving energy efficiency and reducing carbon footprint. Strategic investment in green technologies allows for the reduction of transactional costs through technological innovations that optimize processes and reduce energy and management costs. For Moroccan companies, integrating these technologies into their SSCQM strategies helps reduce operating costs and improve operational efficiency, as demonstrated by King and Lenox (2002) and Sahoo et al. (2023).

Customer engagement and satisfaction are important factors in the financial performance of companies. For Moroccan companies, placing customer engagement and satisfaction at the core of their SSCQM strategy can reduce transactional costs and improve financial performance by minimizing ambiguities and increasing trust. This confirms the findings of Hennig-Thurau and Klee (1997) and Nyaga and Whipple (2011) who support that strong customer relationships reduce monitoring costs and uncertainties, thus increasing customer loyalty and satisfaction. Finally, transparency and traceability of resources in SSCQM reduce costs related to economic exchanges and contractual uncertainties, thereby improving financial stability and market reputation. This is important for Moroccan companies seeking to expand their global presence. This aligns with the studies of Gardner et al. (2019), Paliwal et al. (2020), and Abdel-Basset et al. (2020) who believe that integrating modern technologies to enhance transparency and traceability demonstrates how these innovations can reduce transaction costs and improve financial performance. Thus, the results of this study show that integrating SSCQM principles, supported by rigorous risk and contract management, investments in green technologies, and a focus on transparency and customer satisfaction, can significantly reduce transaction costs and thereby improve the financial performance of Moroccan companies.

CONCLUSION

This study aims to assess the impact of SSCQM adoption on reducing transaction costs and improving the financial performance of Moroccan companies. To achieve this, the paper first established a theoretical framework for the research hypotheses before constructing the empirical model for analysis. These hypotheses were examined from various perspectives, including supplier management, risk management, improving resource efficiency, and strengthening stakeholder relations. Results shows that supplier selection strategies promoting sustainability and rigorous selection criteria based on environmental performance are essential for increasing profitability. Clearly defined contracts including performance targets and environmental standards improve cost management by reducing ambiguity and opportunistic behavior, boosting competitiveness and consolidating long-term supplier relationships. Proactive risk management and effective regulation can reduce the costs of non-compliance and improve financial stability, essential for sustainable success.

Adapting to international sustainability standards, rather than national ones, offers competitive advantages by better responding to global market developments. Integrating these practices into supply chain management reduces costs and optimizes risk management, promoting better financial performance. The analysis also reveals that optimized production processes minimizing waste and inefficiencies reduce production costs and deliver greater profitability. These strategies not only reduce transaction costs but also improve production speed and quality, boosting international competitiveness. Investment in green technologies and sustainable practices distinguishes companies as sustainability leaders in the global marketplace, attracting customers who value environmental commitment. Good customer relationship management, including increased satisfaction and commitment, significantly reduces transaction costs. By eliminating uncertainty and building trust, companies minimize negotiation and litigation costs, improving financial performance. Transparency and traceability in supply chain management reduce the risk of non-compliance and boost market confidence, important for navigating a demanding global business environment.

AUTHOR CONTRIBUTIONS

Conceptualization: Anass Touil, Aziz Babounia, Nabil El Hamidi.
Data curation: Anass Touil, Aziz Babounia, Nabil El Hamidi.
Formal analysis: Anass Touil, Aziz Babounia, Nabil El Hamidi.
Funding acquisition: Anass Touil, Aziz Babounia, Nabil El Hamidi.
Investigation: Anass Touil, Aziz Babounia, Nabil El Hamidi.
Methodology: Anass Touil, Aziz Babounia, Nabil El Hamidi.
Project administration: Anass Touil, Aziz Babounia, Nabil El Hamidi.
Resources: Anass Touil, Aziz Babounia, Nabil El Hamidi.
Software: Anass Touil, Aziz Babounia, Nabil El Hamidi.
Supervision: Anass Touil, Aziz Babounia, Nabil El Hamidi.
Validation: Anass Touil, Aziz Babounia, Nabil El Hamidi.
Visualization: Anass Touil, Aziz Babounia, Nabil El Hamidi.
Writing – original draft: Anass Touil, Aziz Babounia, Nabil El Hamidi.
Writing – review & editing: Anass Touil, Aziz Babounia, Nabil El Hamidi.

http://dx.doi.org/10.21511/imfi.21(3).2024.15

REFERENCES

1. Abdel-Basset, M., Mohamed, R., Sallam, K., & Elhoseny, M. (2020). A novel decision-making model for sustainable supply chain finance under uncertainty environment. *Journal of Cleaner Production, 269*. https://doi.org/10.1016/j.jclepro.2020.122324
2. Ansari, Z. N., & Kant, R. (2017). A state-of-art literature review reflecting 15 years of focus on sustainable supply chain management. *Journal of Cleaner Production, 142,* 2524-2543. https://doi.org/10.1016/j.jclepro.2016.11.023
3. Bastas, A., & Liyanage, K. (2018). Sustainable supply chain quality management: A systematic review. *Journal of Cleaner Production, 181,* 726-744. https://doi.org/10.1016/j.jclepro.2018.01.110
4. Berrone, P., Fosfuri, A., Gelabert, L., & Gomez-Mejia, L. R. (2013). Necessity as the mother of 'green'inventions: Institutional pressures and environmental innovations. *Strategic Management Journal, 34*(8), 891-909. https://doi.org/10.1002/smj.2041
5. Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management: moving toward new theory. *International Journal of Physical Distribution & Logistics Management, 38*(5), 360-387. https://doi.org/10.1108/09600030810882816
6. Coase, R. (1991). The institutional structure of production. *Journal des Economistes et des Etudes Humaines [Journal of Economic and Humanities Studies], 2*(4), 431-440. https://doi.org/10.1515/jeeh-1991-0401
7. Gardner, T. A., Benzie, M., Börner, J., Dawkins, E., Fick, S., Garrett, R., &Wolvekamp, P. (2019). Transparency and sustainability in global commodity supply chains. *World Development, 121,* 163-177. https://doi.org/10.1016/j.worlddev.2018.05.025
8. Glas, A. H., Henne, F. U., & Essig, M. (2018). Missing performance management and measurement aspects in performance-based contracting: A systematic process-based literature analysis of an astonishing research gap. *International Journal of Operations & Production Management, 38*(11), 2062-2095. https://doi.org/10.1108/IJOPM-09-2016-0571
9. Graham, S., Graham, B., & Holt, D. (2018). The relationship between downstream environmental logistics practices and performance. *International Journal of Production Economics, 196,* 356-365. https://doi.org/10.1016/j.ijpe.2017.12.011
10. Grimard, A., Lake, S., Mardas, N., Godar, J., & Gardner, T. (2017). Supply chain transparency network: State of play. In *Global Canopy Programme & Stockholm Environment Institute (SEI), Stockholm* (pp. 70-77). Received from https://www.researchgate.net/publication/326508527_Supply_chain_transparency_network_State_of_play
11. Halldórsson, Á., Kotzab, H., & Skjøtt-Larsen, T. (2009). Supply chain management on the crossroad to sustainability: a blessing or a curse? *Logistics Research, 1,* 83-94. https://doi.org/10.1007/s12159-009-0012-y
12. Hart, S. L., & Dowell, G. (2011). Invited editorial: A natural-resource-based view of the firm: Fifteen years after. *Journal of Management, 37*(5), 1464-1479. https://doi.org/10.1177/0149206310390219
13. Hennig-Thurau, T., & Klee, A. (1997). The impact of customer satisfaction and relationship quality on customer retention: A critical reassessment and model development. *Psychology & Marketing, 14*(8), 737-764. https://doi.org/10.1002/(SICI)1520-6793(199712)14:8<737::AID-MAR2>3.0.CO;2-F
14. Hoejmose, S., Brammer, S., & Millington, A. (2013). An empirical examination of the relationship between business strategy and socially responsible supply chain management. *International Journal of Operations & Production Management, 33*(5), 589-621. https://doi.org/10.1108/01443571311322733
15. Hofstetter, J. S. (2018). Extending management upstream in supply chains beyond direct suppliers. *IEEE Engineering Management Review, 46*(1), 106-116. https://doi.org/10.1109/EMR.2018.2810078
16. Hunt, S. D., Sparkman Jr, R. D., & Wilcox, J. B. (1982). The pretest in survey research: Issues and preliminary findings. *Journal of Marketing Research, 19*(2), 269-273. https://doi.org/10.1177/002224378201900211
17. Johl, S. K., & Toha, M. A. (2021). The nexus between proactive eco-innovation and firm financial performance: a circular economy perspective. *Sustainability, 13*(11). https://doi.org/10.3390/su13116253
18. Khokhar, M., Zia, S., Islam, T., Sharma, A., Iqbal, W., & Irshad, M. (2022). Going green supply chain management during covid-19, assessing the best supplier selection criteria: a triple bottom line (TBL) approach. *Problemy Ekorozwoju [Ecodevelopment Problems], 17*(1), 36-51.https://doi.org/10.35784/pe.2022.1.04
19. King, A., & Lenox, M. (2002). Exploring the locus of profitable pollution reduction. *Management Science, 48*(2), 289-299. https://doi.org/10.1287/mnsc.48.2.289.258
20. Laguir, L., Laguir, I., & Tchemeni, E. (2019). Implementing CSR activities through management control systems: A formal and informal control perspective. *Accounting, Auditing & Accountability Journal, 32*(2), 531-555. https://doi.org/10.1108/AAAJ-05-2016-2566
21. Lee, M. K., & Turban, E. (2001). A trust model for consumer internet shopping. *International Journal of Electronic Commerce, 6*(1), 75-91. https://doi.org/10.1080/10864415.2001.11044227
22. Leuschner, R., Rogers, D. S., & Charvet, F. F. (2013). A meta-analysis of supply chain integration and firm performance. *Journal of Supply Chain Management, 49*(2), 34-57. https://doi.org/10.1111/jscm.12013

23. Manavalan, E., & Jayakrishna, K. (2019). An analysis on sustainable supply chain for circular economy. *Procedia Manufacturing, 33,* 477-484. https://doi.org/10.1016/j.promfg.2019.04.059

24. Marín-Vinuesa, L. M., Scarpellini, S., Portillo-Tarragona, P., & Moneva, J. M. (2020). The impact of eco-innovation on performance through the measurement of financial resources and green patents. *Organization & Environment, 33*(2), 285-310. https://doi.org/10.1177/1086026618819103

25. Marković, G. V., & Mihić, M. M. (2022). Strategic Turnaround in the Paper Industry: A New Model for the Procurement of Recycled Paper. *Sustainability, 14*(3), 1475. https://doi.org/10.3390/su14031475

26. Nyaga, G. N., & Whipple, J. M. (2011). Relationship quality and performance outcomes: Achieving a sustainable competitive advantage. *Journal of Business Logistics, 32*(4), 345-360. https://doi.org/10.1111/j.0000-0000.2011.01030.x

27. Pagell, M., & Shevchenko, A. (2014). Why research in sustainable supply chain management should have no future. *Journal of Supply Chain Management, 50*(1), 44-55. https://doi.org/10.1111/jscm.12037

28. Paliwal, V., Chandra, S., & Sharma, S. (2020). Blockchain technology for sustainable supply chain management: A systematic literature review and a classification framework. *Sustainability, 12*(18), 7638. https://doi.org/10.3390/su12187638

29. Pettit, T. J., Croxton, K. L., & Fiksel, J. (2019). The evolution of resilience in supply chain management: a retrospective on ensuring supply chain resilience. *Journal of Business Logistics, 40*(1), 56-65. https://doi.org/10.1111/jbl.12202

30. Poppo, L., & Zenger, T. (2002). Do formal contracts and relational governance function as substitutes or complements? *Strategic Management Journal, 23*(8), 707-725. https://doi.org/10.1002/smj.249

31. Porter, M. E., & Linde, C. V. D. (1995). Toward a new conception of the environment-competitiveness relationship. *Journal of Economic Perspectives, 9*(4), 97-118. https://doi.org/10.1257/jep.9.4.97

32. Sahoo, S., Kumar, A., & Upadhyay, A. (2023). How do green knowledge management and green technology innovation impact corporate environmental performance? Understanding the role of green knowledge acquisition. *Business Strategy and the Environment, 32*(1), 551-569. https://doi.org/10.1002/bse.3160

33. Selviaridis, K., & Spring, M. (2007). Third party logistics: a literature review and research agenda. *The International Journal of Logistics Management, 18*(1), 125-150. https://doi.org/10.1108/09574090710748207

34. Seuring, S., & Müller, M. (2008). From a literature review to a conceptual framework for sustainable supply chain management. *Journal of Cleaner Production, 16*(15), 1699-1710. https://doi.org/10.1016/j.jclepro.2008.04.020

35. Shahsavari, A., & Akbari, M. (2018). Potential of solar energy in developing countries for reducing energy-related emissions. *Renewable and Sustainable Energy Reviews, 90,* 275-291. https://doi.org/10.1016/j.rser.2018.03.065

36. Shrivastava, P. (1995). Ecocentric management for a risk society. *Academy of Management Review, 20*(1), 118-137. https://doi.org/10.5465/amr.1995.9503271996

37. Spekman, R. E., Kamauff, J. W., & Myhr, N. (1998). An empirical investigation into supply chain management: a perspective on partnerships. *Supply Chain Management: an International Journal, 3*(2), 53-67. https://doi.org/10.1108/09600039810247542

38. Sukati, I., Hamid, A. B., & Baharun, R. (2013). Testing the effect of the supply chain management implementation on business performance: An empirical study. *International Business Research, 6*(1), 76. https://doi.org/10.5539/ibr.v6n1p76

39. Touil, A., Ayad, K., El Hamidi, N., & Babounia, A. (2023). Toward greener supply chains: Analysis of the determining factors. *Environmental Economics, 14*(2), 114-126. https://doi.org/10.21511/ee.14(2).2023.09

40. Vaduva, S., Alistar, V. T., Thomas, A. R., Lupițu, C. D., & Neagoie, D. S. (2016). *Moral leadership in business: towards a business culture of integrity*. Springer International Publishing. Received from https://link.springer.com/book/10.1007/978-3-319-42881-9

41. Williamson, O. (1985). *The Economic Institutions of Capitalism*. New York, NY: The Free Press.

http://dx.doi.org/10.21511/imfi.21(3).2024.15