

Uncertain Supply Chain Management

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The impact of cost management accounting techniques on supply chain performance using the balanced scorecard approach: A case of logistics companies in Vietnam

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ABSTRACT

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This study aims to discover the relationship between CMA Techniques and Supply Chain Performance at logistics enterprises in Vietnam. Based on qualitative research methods combined with quantitative research, the survey subjects were 300 accounting staff and managers of large logistics enterprises in Vietnam. Qualitative research is used to summarize the business situation of the companies, build research models and hypotheses based on literature review and get opinions from the managers and accountants about the quality of the questionnaire. The study has developed a scale to evaluate the Supply Chain Performance of the businesses according to the Balanced Scorecard model. Quantitative research is used to measure and explain the relationship between factors in the model using SPSS and AMOS tools. The results of the linear structural model show that CMA Techniques have a positive impact on the Supply Chain Performance of logistics businesses in Vietnam. This study also demonstrates that CMA Techniques have a positive impact on Financial Performance, Internal Business Process, Learning and Growth, Customer Perspectives of the businesses. Based on these findings, the author proposes recommendations for governments and the companies to improve the effectiveness of CMA Techniques, thereby improving their Supply Chain Performance.

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1. Introduction

Cost Management Accounting (CMA) is an indispensable part of a business's management system. As an important information channel, the main task of CMA is to provide information about costs to support managers in evaluating operations, financial controlling and making business decisions (Fleischman & McLean, 2020; Garg, et al., 2003; Horngren et al., 2002). CMA includes recording and classifying costs; establishing norms and cost estimates; product costing; analyzing cost fluctuation information; and making CMA reports (Kostyukova, 2018). For CMA to carry out its functions, it is necessary to have a system of technical methods. Since its inception, many CMA methods from traditional to modern have appeared that have contributed to improving management efficiency and operating results of businesses (Caplan, 2006).

Supply chain is a collection of activities from the production, transportation, and distribution of products or services from suppliers to final customers. This process takes place from the stage when a business searches for raw materials until it is delivered to customers (Beamon, 1999). CMA plays a particularly important role in supply chain operations, providing information to managers, helping them make decisions to optimize business processes. CMA provides both information about the external environment (information about the market, customers, business environment, customer needs, industry trends, economic and political conditions) and internal information within the enterprise (information about financial situation, ways to gain competitive advantage, special capabilities, internal resources, ability to create and maintain sustainable competitive advantage, supply chain structure response, material management methods, service quality, order response time) (Pradhan et al., 2018; Hald & Thrane, 2015). CMA provides cost information in the supply chain through several modern CMA techniques such as: Activity Based Costing, Target Costing, Life Cycle Costing, Just in Time System, Throughput Costing and Kaizen costing (Tabitha & Ogungbade, 2016).

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In 2023, Vietnam ranked 10/50 in the emerging logistics market. With an average annual industry growth rate of 14 - 16%, the quantity and quality of logistics services are improved, making an important contribution to bringing Vietnam's total import-export turnover in 2022 to 732.5 billion USD, an increase of 9.5% compared to 2021. However, in the 2023 Logistics Performance Index (LPI) ranking, Vietnam ranked 43rd, down 4 places compared to 39th in 2018 (Ministry of Industry and Trade of Vietnam, 2023). After the Covid-19 pandemic, small and medium-sized logistics businesses face financial risks, market risks, and significant reductions in business performance (Nguyen et al., 2022; Cuong & Tien, 2022). The reason is that the connection between logistics and manufacturing companies; logistics and export companies is still weak; a network of large-scale logistics enterprises with the capacity to lead the market and promote the development of the logistics industry has not yet been formed. Many companies have not been successful in maximizing the potential of their supply chains because they often fail to build and develop appropriate SCP metrics and have not evaluated SCP (Nguyen, 2022). Some logistics businesses in Vietnam have not maximized their SCP, logistics centers have not been developed, especially regional logistics centers (Linh & Huong, 2020).

In that context, improving the effectiveness of technical tools in CMA is one of the solutions to help improve the efficiency of the supply chain at logistics enterprises. CMA Techniques are designed to generate information for control and decision making of logistics companies (Almatarneh et al., 2022). When logistics companies cooperate with each other, they have a common interest in maximizing product efficiency and profits. On the other hand, they also have conflicts of interest, for example, the pricing decisions of one business can affect the market of another business in the supply chain. Currently, CMA provides necessary information to help managers make decisions related to transactions in the supply chain (Doktoralina & Apollo, 2019; Dobroszek et al., 2020). Studies have shown that CMA has a positive impact on SCP. Therefore, establishing a set of criteria for evaluating SCP at logistics businesses in Vietnam and evaluating the impact of CMA tools on the SCP of these businesses is necessary.

Although there have been a number of studies on the impact of CMA Techniques in particular or CMA in general on SCP, no research has been conducted on logistics businesses in Vietnam. There have also been no studies that have built SCP measurement scales based on the Balanced Scorecard (BSC) model - a performance assessment tool widely recognized in practice. Accordingly, SCP will be measured by 4 pillars in the BSC model (financial perspective, customer perspective, business processes perspective, learning and growth perspective) (Kaplan, 2007, 2009, 2015). In addition, there have been no studies examining the impact of CMA Techniques on each element that constitutes SCP at these enterprises. To help companies have general knowledge and a basis to improve the effectiveness of applying CMA Techniques and SCP, this study aims to build a SCP measurement scale based on the BSC model, exploring the impact of CMA Techniques to SCP of logistics businesses in Vietnam. In addition, the study helps answer the question, what impact does CMA Techniques have on financial performance, customer relationships, effectiveness of internal processes, and ability to learn and growth of these businesses. The research uses qualitative research methods combined with quantitative research, the survey subjects are 300 accounting department employees and managers at 200 large-scale logistics enterprises in Vietnam. From there, the author proposes recommendations for the government and the businesses to improve the effectiveness of CMA application, thereby improving SCP.

In addition to the introduction and conclusion, the article includes 5 parts: Literature review, theoretical basis and research model, research methodology, research results and discussion.

2. Literature Review

2.1. Cost Management Accounting Techniques

CMA appeared before the 1950s with the original purpose of determining costs, valuing stocks and allocating overhead costs. At that time, there appeared the determination of inventory value using the FIFO method and LIFO method, supporting managers in cost management. Since 1965, management accounting has shifted to providing information for managers to perform control and decision-making functions. New CMA Techniques such as marginal costing and responsibility accounting were introduced at this stage. Since 1985, as technology developed and competition increased, the goal of management accounting was still to control costs, but with the support of more modern techniques to minimize unnecessary costs. Technical tools to cut costs commonly applied by companies at this stage include Just – in – Time and Activity-Based Costing. From 1995 onwards, strong advances in technology and fierce competition have caused many changes in the operations of businesses. Companies focus on enhancing value creation through the efficient use of resources. The managers use management accounting tools to evaluate operational efficiency and eliminate ineffective activities. New techniques introduced during this period are Total Quality Management, Activity Based Management, Benchmarking and Reengineering, Target Costing, Kaizen Costing, Life Cycle Costing. CMA techniques used in previous phases continue to be used in subsequent phases but are adapted to the new environment. This is consistent with the view that traditional and advanced CMA methods tend to complement each other (Ovunda, 2015; Edwards & Boyns, 2012; Fleischman et al., 2020). In recent years, CMA has been deeply researched in the manufacturing, trade, and service sectors around the world. For example, research on CMA application in Saudi manufacturing enterprises (El-Ebaishi et al., 2003); benefits, opportunities and challenges when applying CMA Techniques (Adler et al., 2000); research on CAM Techniques in small and medium enterprises in Canada and Australia (Armitage, H.M., 2016); environmental management accounting in the European Union

emissions trading system (Naranjo Tuesta et al., 2021); in small and medium-sized hospitality businesses in India (Chand & Dahiya, 2010), or in the accommodation industry (Campos et al., 2022). In the field of logistics, research focuses on applying management accounting, such as applying strategic management accounting in logistics enterprises in Vietnam (Vu et al., 2022); or researching logistics businesses in the Internet era (Tan, 2023), the impact of management accounting information systems on logistics functions in Vietnam (Pomberg & Pourjalali, 2009). Most studies systematize the theoretical framework of popular CMA Techniques methods and evaluate the current situation of CMA in businesses using qualitative research methods.

2.2. Supply Chain Performance

The supply chain is involved in the entire product life cycle, from raw material procurement, manufacturing to distribution, customer service and finally product recycling and disposal (Beamon, 1999). In today's competitive business environment, SCP is one of the most important concepts that need to be evaluated. SCP measurement is the basis for perfecting the supply chain and effective supply chain management. Over the past three decades, several frameworks and systems of SCP assessment indicators have been developed to meet the requirements of managers (Balfaqih et al., 2016; Gunasekaran, A. et al., 2014). SCP has been mentioned with different perspectives, depending on the supply chain manager's perspective. Most research focuses on one or a few key parts or processes of the supply chain. SCP is studied in relation to e-procurement (Chang et al., 2013); the similarities and differences between the SCP of the manufacturing and service sectors demonstrate that effective supply chain strategies in one sector may not be appropriate in the other (Sengupta et al., 2006); the role of partnership, the relationship between buyers and sellers and its impact on the SCP of businesses in South Korea (Ryu et al., 2009); designing KPIs system and measuring SCP in retail system (Anand & Grover, 2015); the impact of commodity diversity on SCP (Thonemann & Bradley, 2002); the relationship between customer returns and SCP (Su et al., 2009); the relationship between corporate culture and SCP (Cadden et al., 2013); the impact of Blockchain technology and smart inventory systems on SCP (Mondol, 2021); impact of transport disruption on SCP (Wilson, 2007).

The SCP scale has been established since 1999 with two groups of qualitative and quantitative scales with indicators revolving around two issues of cost and customer service (Beamon, 1999). Subsequently, competition increased while production resources were limited, requiring the supply chain to be flexible in the face of environmental changes, therefore, the supply chain was evaluated through response time (Whitten et al., 2012). In the trend of globalization, the products and activities of companies have crossed the borders of a country, requiring a more comprehensive assessment method for businesses. The BSC model was born and met the above needs of businesses. After BSC, many other assessment models were introduced such as SCOR (1996) by the Council for Supply Chain Management, ROF (1999) by Beamon. After that, a series of studies to build SCP assessment models were subsequently carried out and verified (Estampe et al., 2013; Lai et al., 2002; Lai & Cheng, 2003). Several studies have used the BSC to evaluate SCP (Nzuve & Nyaega, 2013; Susanty et al., 2014; Afonso et al., 2015; Shafiee et al., 2014). Several studies have developed and evaluated SCP measurement scales at logistics enterprises (Lai et al., 2002; 2003; 2004; Jothimani et al., 2014). Research methods are mainly quantitative, combined with qualitative and case studies. However, there has been no research on SCP in terms of applying BSC in logistics companies.

2.3. Relationship between Cost Management Accounting Techniques and Supply Chain Performance

There are many studies on the role of management accounting in general and CMA in the supply chain. Basic theoretical issues about management accounting in the supply chain have been systematized (Hald & Thrane, 2015; Taschner & Charifzadeh, 2020). Management accounting plays an important role in supply chain management and performance of Indian businesses (Pradhan et al., 2018); in listed companies in Malaysia (Mohd Jamal et al., 2020); healthcare sector (Nartey, 2023). The relationship between supply chain management and financial performance in the agricultural business sector in Egypt was tested (Wahdan & Emam, 2017); the relationship between management accounting, supply chain management and business development based on a survey in Yemen also has been done (Waked et al., 2023); Water management design and wine supply chain in Australia was introduced (Christ, 2014). This relationship was also tested for logistics businesses in Poland (Dobroszek et al., 2020), the role of target costing, value chain costing and quality costing and SCP of logistics businesses (Almatarneh et al., 2022), of logistics businesses in Malaysia (Doktoralina & Apollo, 2019). For agricultural businesses in Malaysia, cost accounting systems also have a significant impact on SCP (Hasyim & Jabid, 2019). Most studies use survey methods to subjects who are managers at the businesses, then using tools such as SPSS, PLS, Amos to process and analyze data. The results show that management accounting has a positive relationship with SCP, confirming that the better a logistics enterprise applies CMA, the higher its SCP. However, there have been no studies evaluating the impact of CMA Techniques on the SCP of logistics businesses in Vietnam.

3. Theoretical basis and research model

3.1 Theoretical basis

3.1.1. Cost Management Accounting Techniques

There are many management accounting tools that have been created, applied and developed at different levels in businesses. Some studies have classified CMA Techniques into traditional tools and modern tools (Dahal, 2021). Most studies classify

management accounting techniques according to the functions of management accounting: costing techniques, planning, performance evaluation, decision making, competitor accounting, customer accounting (Urif, 2015; Aksoylu & Aykan, 2013). Among them, CMA tools mainly used by manufacturing and service businesses include: Just in Time, Activity Based Costing, Target Costing, Life Cycle Costing, Throughput Accounting, Kaizen Costing; Quality Costing, Value chain costing, and Attribute Based Costing. CMA Techniques are summarized by the author in the following table:

Table 1
Cost Management Accounting Techniques

Variables	CMA Techniques	Source
CMA1	Attribute Based Costing	Azeez et al., 2020; Kadhim & Al-Ghezi, 2021; Oleiwi, 2023
CMA2	Life-cycle costing	Gluch & Baumann, 2004; Rödger et al., 2018; Okano, 2001
CMA3	Quality costing	Dale et al., 2017; Jafar et al., 2010; Neyestani, 2017
CMA4	Target costing	Helms et al., 2005; Ahn et al., 2018; Lockamy III & Smith, 2000
CMA5	Value chain costing	Bhargava et al., 2018; Ussahawanitchakit, 2017; Seuring, 2002
CMA6	Just in Time	Hutchins, 1999; Lai 2016; Chan et al., 2010
CMA7	Activity Based Costing	Bokor & Markovits-Somogyi, 2015; Bokor, 2008; Schulze et al., 2012
CMA8	Throughput Accounting	Islam, 2015; Pretorius, 2004; Lutilsky et al., 2018
CMA9	Kaizen Costing	Miranda et al., 2020; Kelesbayev, 2020; Sani & Allahverdzadeh, 2012

(Source: Compiled by the author)

3.1.2. Balanced Scorecard

BSC was first introduced in 1992 with the original version being purely financial performance measures and operational performance measures combining 3 aspects: Customer satisfaction, internal business processes, and operational performance measure and learning (Kaplan, 1992). Then, BSC was transformed from performance assessment to strategic management (Kaplan, 2001). The theoretical framework of BSC continues to be expanded and developed by Kaplan in subsequent studies (Kaplan, 2007, 2009, 2015). BSC is one of the most important developments in management accounting and therefore, over the past 20 years, BSC has been interested in in-depth research by scientists and practical applications by businesses around the world. There have been studies on BSC in various service industries such as telecommunications (Nzuve & Nyaega, 2013; Dahal et al., 2022), healthcare (Betto et al., 2022; Amer, 2022); education (Brown, 2012), insurance (Dwivedi et al., 2022), tourism and hospitality (Fatima & Elbanna, 2022; Sainaghi et al., 2013). There have been a number of studies on BSC application in logistics enterprises such as: controlling logistics costs by applying BSC in corporate governance (Sadowska, 2015); increasing business value (Tong et al., 2010); evaluating SCP and management system, using BSC to improve operational efficiency in the automobile industry in India (Perminova & Lobanova, 2018), SCP of enterprises in China (Wang et al., 2012); evaluating lean logistics performance using the BSC tool (Tong et al., 2015); sustainable BSC: considering social, environmental and human aspects (Hansen & Schaltegge, 2016). In addition, BSC is also researched in small - medium enterprises and large enterprises (Madsen, 2015). Current studies have confirmed the importance of this tool in evaluating performance. Basically, BSC is measured by four aspects: Financial perspective, customer perspective, business processes perspective, learning and growth perspective. (Kaplan, 2007, 2009, 2015; Frederico et al., 2021)

❖ Financial perspective

The financial perspective is the primary focus of a business, and it is also integral to balanced scorecard analysis. Businesses need to analyze this perspective to find out whether they are making money or not, are their shareholders satisfied? It also tells them about the results of their past decisions. Proficient cash management is ensured by measuring the financial perspective of the BSC. Financial results are expressed in stock value, cost reduction, profitability, added value, income before interest, taxes, depreciation and deductions (Kaplan, 2007, 2009, 2015; Frederico et al., 2021)

❖ Customer perspective

Each organization has different roles and tasks to serve each specific customer experience in the market. It is expressed in a target group, namely their customers. Customers determine acceptable quality, price, service, and profitability for products or services. Businesses need to meet customer expectations as much as possible, and these expectations can change at any time. The results of this aspect are shown in customer market share, customer awareness of added value, level of customer interaction at all stages of the business process, and level of customer satisfaction, implemented customer retention strategies (Kaplan, 2007, 2009, 2015; Frederico et al., 2021)

❖ Business processes perspective

From this perspective, businesses need to ask which processes add value in the organization and what activities need to be performed within these processes. The added value will mainly be demonstrated through customer-facing performance due to optimal alignment between processes, activities, and decisions. The results of this aspect are measured by process efficiency, capital turnover time, level of flexibility, level of transparency, level of collaboration, level of waste reduction, integrating processes (Kaplan, 2007, 2009, 2015; Frederico et al., 2021)

❖ Learning and growth perspective

An organization's ability to learn and innovate is proof that it cares about the quality of human resources, work management, and the ability to continuously improve and develop in a dynamic environment. This environment can change daily due to new laws and regulations, economic changes or increased competition. This perspective therefore answers the question: “How can we maintain the ability to achieve our chosen strategy?” The results of this aspect are measured by completeness and comprehensiveness of technology, compatibility of infrastructure with new technology, level of horizontal integration (Information and Technology), level of integration (Information and Technology), human resource level, level of legal compliance, level of administrator participation, coordination effectiveness (Kaplan, 2007, 2009, 2015; Frederico et al., 2021)

3.1.3. Supply Chain Performance Measurement – Using Balanced Scorecard

To propose a theoretical framework for measuring SCP in this study, the author based on the analysis of the results of studies evaluating SCP using the BSC tool. A study conducted at the Kenya National Petroleum Corporation demonstrated that the BSC dimensions (Internal Processes, Financial Perspective, Customer Perspective; Learning and Growth) can be used to measure SCP (Nzuve & Nyaega, 2013; Frederico et al., 2021). BSC was developed as an improvement to previous traditional performance measurement methods such as return on investment (ROI), net present value (NPV) (Bhagwat & Sharma, 2007; Rafiq et al., 2020). Research on applying BSC in evaluating SCP of small and medium-sized enterprises Batik conducted interviews with owners of businesses. This study focused on supplier relationship indicators, internal performance indicators (cost and asset management efficiency), and customer communication performance indicators (delivery reliability, responsiveness and flexibility) and with shareholders (probability, return efficiency and equity performance) (Susanty et al., 2014). Similarly, another study successfully built a Lean SCP measurement model based on BSC at a Portuguese small and medium-sized enterprise operating in the food manufacturing sector (Afonso et al., 2015). However, there are also studies that confirm that BSC is only effective in SCP measurement when combined with other technical tools. For example, after reviewing different tools to evaluate SCP, a new approach, based on a DEA network with a BSC approach, was created. This model has been applied in Iran's food industry to evaluate the country's SCP and the results have demonstrated the high effectiveness of the designed model. These findings can be used in various evaluation processes in different industries (Shafiee et al., 2014). A study on BSC development and simulation for Sustainable Supply Chains focused on increasing customer satisfaction with respect to environmental and social aspects. Satisfaction was measured using the customer satisfaction index, the study also looked at employee training time and measured employee/customer retention (Wittstruck & Teuteberg, 2012). A study in India on petroleum SCP measurement identified that in addition to financial aspects, non-financial aspects of supply chain performance such as “stable raw material supply” and product purity” is also included, allowing for a more comprehensive performance assessment (Varma et al., 2007). The learning and development perspective is an aspect that requires continuous growth and innovation to enhance skills in project management, change management and other technical areas (Ferreira et al., 2016). Research on supply chain aspects in the context of Industry 4.0 shows their close alignment with the four BSC perspectives, making it suitable to be considered an SCP measurement system in the current context (Frederico et al., 2021). The researchers have performed various experiments on the application of BSC in evaluating SCP. The key factor that emerges is that the BSC is used as a tool to communicate, clarify strategy and direction within the business, achieving consensus and thus rallying members of the organization in the same direction. The research showed that using the BSC to evaluate SCP has been successful in some areas, so the question is whether a similar approach can be used to measure SCP in the logistics businesses in Vietnam.

In general, this study uses synthetic scales from previous studies; the author adjusted some indicators to suit the logistics field in Vietnam. The SCP assessment scales based on the BSC model are summarized in the following table:

Table 2
SCP measurement scales

Variables	SCP measurement scales	Source
CP	Customer perspective	
CP1	Level of market share	Frederico et al., 2021
CP2	Value added perception	Nzuve & Nyaega, 2013
CP3	Level of customer interaction on processes	Susanty et al., 2014
CP4	Level of customer satisfaction	Rafiq et al., 2020
CP5	Customer retention strategies	Kaplan, 2007, 2009, 2015
IP	Business processes perspective	
IP1	Processes efficiency	Varma et al., 2007
IP2	Response time	Nzuve & Nyaega, 2013
IP3	Level of flexibility	Frederico et al., 2021
IP4	Level and extension of transparency	Rafiq et al., 2020
IP5	Level of collaboration	Varma et al., 2007
IP6	Level of waste reduction	Kaplan, 2007, 2009, 2015
IP7	Level and extension of process integration	

Table 2

SCP measurement scales (Continued)

Variables	SCP measurement scales	Source
FP	Financial perspective	
FP1	Shareholder value	Nzuve & Nyaega, 2013
FP2	Level of cost reduction	Frederico et al., 2021
FP3	Profitability	Rafiq et al., 2020
FP4	Earned value added	Kaplan, 2007, 2009, 2015
FP5	Earnings before interests, taxes, depreciation and amortization	
LGP	Learning and growth perspective	
LGP1	Adequacy and extension of technologies	Frederico et al., 2021
LGP2	Adequacy of infrastructure to the new technologies	Rafiq et al., 2020
LGP3	Level of horizontal integration (Information and Technologies)	Varma et al., 2007
LGP4	Level of vertical integration (Information and Technologies)	Ferreira et al., 2016
LGP5	Level of people competences	Kaplan, 2007, 2009, 2015
LGP6	Adequacy to the compliance and Legal Requirements	
LGP7	Level of leadership engagement	
LGP8	Coordination effectiveness	

(Source: Compiled by the author)

3.2. Research model and hypothesis

Studies on the impact of management accounting on SCP have yielded relatively similar results, most of which show a positive relationship. Supply chain management has a significant impact on financial performance through improving productivity, reducing costs and improving profits. Applying effective supply chain management can improve the use of responsibility accounting in the Egyptian agribusiness sector (Wahdan & Emam, 2017). Management accounting and supply chain management strategies have a positive impact on business growth based on a survey in Yemen (Waked et al., 2023). Strategic management accounting has a significant positive relationship with SCP, and SCP has a significant positive relationship with the profitability of logistics companies in Poland (Dobroszek et al., 2020). Several studies have demonstrated that CMA techniques have an important role and positive impact on SCP, such as target costing, value chain costing and quality costing in logistics enterprises around the world (Almatarneh et al., 2022), of logistics businesses in Malaysia (Doktoralina & Apollo, 2019). For agricultural businesses in Malaysia, cost accounting systems also have a significant impact on SCP (Hasyim & Jabid, 2019). In this study, the author asks the question, whether CMA techniques have a positive impact on the SCP of logistics businesses in Vietnam? From which, the author builds the hypothesis that CMA Techniques has positive impact on SCP of logistics enterprises in Vietnam. In addition, a research with businesses listed on stock exchanges has demonstrated that CMA has a positive impact on market share and added value for customers (Abbasi et al., 2016), and similarly CMA also had a positive impact on customer satisfaction at the Libyan oil company (Kalifa, 2020); or the positive impact of CMA on the financial performance of businesses in Jordan (Alrjoub et al., 2023) and the banking sector in Pakistan (Khan et al., 2021). A study has also proved that CMA has an impact on the business processes of Ukrainian Companies (Yatsenko & Kudriavets, 2019). On that basis, the author builds four additional hypotheses H1a, H1b, H1c, and H1d to access the impact of CMA Techniques on each component of SCP based on the BSC model.

Hypothesis H1: CMA Techniques has positive impact on SCP of Logistics enterprises in Vietnam.

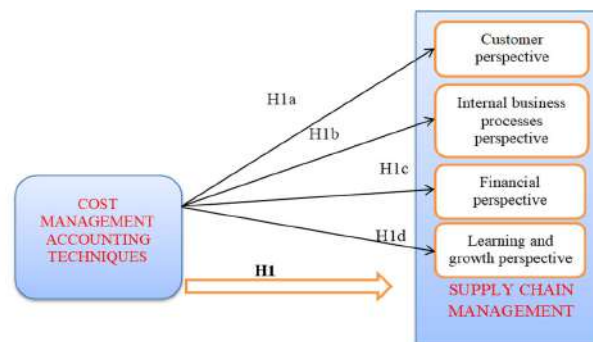
Hypothesis H1a: CMA Techniques has positive impact on Customer perspective of logistics enterprises in Vietnam.

Hypothesis H1b: CMA Techniques have positive impact on business processes perspective of logistics enterprises in Vietnam.

Hypothesis H1c: CMA Techniques has positive impact on financial perspective of Logistics enterprises in Vietnam.

Hypothesis H1d: CMA Techniques has positive impact on Learning and growth perspective of logistics enterprises in Vietnam.

The research model is presented in Fig. 1.

**Figure 1. Research model**

(Source: Frederico et al., 2021; Kaplan, 2007, 2009, 2015; Rafiq et al., 2020; Varma et al., 2007; Ferreira et al., 2016; Nzuve & Nyaega, 2013; Susanty et al., 2014; Abbasi et al., 2016; Kalifa, 2020; Alrjoub et al., 2023; Khan et al., 2021; Yatsenko & Kudriavets, 2019)

4. Research Methodology

The research method was carried out in two steps: qualitative and quantitative research.

4.1. Qualitative research

The author read articles and textbooks to find research gaps. In this step, the most important thing is to find the main research concept, then build a research model around this concept. To build a research model, it is necessary to have a fundamental theory as a foundation to build a hypothesis about the relationship between the independent variables and the dependent variables. Another important issue is that research concepts and the relationships between research concepts in the model must be measured and tested in practice. After that, the author conducted preliminary research to design a system of observed variables in the model. Based on an overview of the research situation, the author built the first draft scale for research concepts. Next, the author interviewed 12 managers and accountants at the logistics enterprises in Vietnam to determine the appropriate level and receive suggestions for editing and supplementing the scales in the research model to make them suitable for the businesses in Vietnam. The results of discussion with experts formed the questionnaires.

4.2. Quantitative research

The research method is carried out in two steps: qualitative research and quantitative research. Qualitative research was conducted with a sample of 8 managers and accountants at Vietnamese logistics enterprises to test the appropriateness of the measurement scales for the factors. Qualitative research results help the author establish quantitative measurement tools. The sample size applied in this study is based on the requirement to meet the indicators of Exploratory Factor Analysis (EFA) and Multiple Regression Analysis. For EFA analysis, the minimum sample size is 5 times the total number of observed variables in the proposed model, the appropriate sample size for this study is 170. To meet sample size requirements, quantitative research methods were conducted with 300 surveys to test the level of measurement of concepts in the research model. Research subjects were asked to answer questions on a 5-point Likert scale (from 1 - *very bad or not used* to 5 - *very good*). Questionnaire serves as the main tool for data collection. Confirmatory factor analysis (CFA) was used to refine the measurement scale of the concepts. Then, structural equation modeling (SEM) is used to test the research hypotheses and build the SEM regression model.

- Scale of research concepts: There are 34 observed variables (corresponding to 1 independent factor and 1 group of dependent factors).
- Sample statistics: The number of sent survey questionnaires is 300, the number of valid questionnaires used for analysis is 286. Survey subjects are managers at all levels and accountants at logistics enterprises in Vietnam. Participants of this know the purpose, benefits, and risks before they agree or decline to join. The informed consent for participation in the study has been obtained. This consent was written by filling up a form (Consent Form – Appendix 1). The author knows who the participants are but keeps that information hidden from everyone else. The author secretes their personally identifiable data so that it cannot be linked to other data by anyone else.

5. Research results

5.1. Qualitative research results:

Based on the definitions and measurement scales of the factor from previous studies and the actual conditions of the Logistics enterprises in Vietnam, the author selected 34 observed variables to constitute 1 independent factor and 1 independent factor group in the model. The concepts and measurement scales are presented in questionnaires (See appendix 2)

5.2. Quantitative research result

5.2.1. Cronbach's Alpha reliability test

All observed variables have Corrected Item - Total Correlations greater than 0,3, and Cronbach's Alpha coefficients are all 0,6 or higher, so all 34 variables are retained (9 independent variables and 25 dependent variables).

Table 3
Results of testing the scale

Factor	Number of observed variables	Cronbach's Alpha	Number of variables retained	Number of variables removed from the model
CMAT	9	0.930	9	0
CP	5	0.792	5	0
IPP	7	0.952	7	0
FP	5	0.916	5	0
LGP	8	0.970	8	0
Total	34		34	0

(Source: Processing by SPSS software)

5.2.2. Exploratory Factor Analysis (EFA)

The principal axis coefficient is employed in conjunction with Promax Rotation, and a Factor Loading Factor of $\geq 0,5$ is applied to incorporate the remaining variables into the Exploratory Factor Analysis (EFA) model, aiming to validate the scale. The obtained KMO coefficient is 0.907, surpassing the threshold of 0,5. Bartlett's Test statistic records 9437,320 with a significance level of 0.000, which is less than 0.05. Additionally, the Cumulative Variance reaches 70,585%, exceeding 50%. These findings confirm complete consistency in the analyzed data. Consequently, all factor loadings surpass 0.5, and the explained variance surpasses 50%, confirming that the remaining 34 observed variables are exactly grouped as in the original scale.

Table 4
KMO and Bartlett's Test Result

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,907
	Approx. Chi-Square	9437.320
Bartlett's Test of Sphericity	DF	561
	Sig.	0.000

(Source: Processing by SPSS software)

Following the Exploratory Factor Analysis (EFA), it is evident that the model aligns with the research model, with no elimination of variables observed from the research variables. Table 5 reveals no emergence of new factor groups.

Table 5
Exploratory Factor Analysis Matrix

	Factor				
	1	2	3	4	5
LGP6	0.956				
LGP5	0.942				
LGP7	0.918				
LGP8	0.913				
LGP4	0.864				
LGP3	0.858				
LGP1	0.835				
LGP2	0.833				
CMAT8		0.819			
CMAT7		0.800			
CMAT5		0.787			
CMAT6		0.786			
CMAT9		0.771			
CMAT4		0.756			
CMAT1		0.752			
CMAT2		0.751			
CMAT3		0.712			
IPP2			0.883		
IPP7			0.864		
IPP5			0.862		
IPP6			0.850		
IPP4			0.850		
IPP3			0.837		
IPP1			0.804		
CP3				0.945	
CP4				0.907	
CP5				0.899	
CP2				0.863	
CP1				0.387	
FP1					0.913
FP3					0.872
FP2					0.818
FP4					0.796
FP5					0.755

Extraction Method: Principal Axis Factoring.

Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

(Source: Processing by Amos software)

5.2.3. Confirmatory Factor Analysis (CFA)

Based on the results of the Exploratory Factor Analysis (EFA), 5 key concepts have been identified in the research model. To evaluate the model fit, several measures have been used, including the Chi-square command (CMIN), Chi-square adjusted for degrees of freedom (CMIN/df), GFI index, TLI, CFI, and RMSEA index. The model is considered suitable for market data when it meets the following criteria: $GFI = 0.831 \geq 0,8$, $TLI = 0.937$ and $CFI = 0.942$ values $\geq 0,9$ (Baumgartner & Homburg, 1996, Doll et al. 1994, Bentler & Bonelt, 1980), $CMIN/df \leq 3$, and $RMSEA = 0.60 \leq 0,08$ (Steiger et al., 1990). The results

of the Confirmatory Factor Analysis (CFA) indicate that the research model is appropriate (Fig. 2). The observed variables representing the factors have a significant value of 0.00; indicating that they have a good representation for the CFA model factor. Additionally, statistical indicators of normalized weights all show high values and statistical significance (P-value = 0.000), indicating that the concepts have achieved discriminant value.

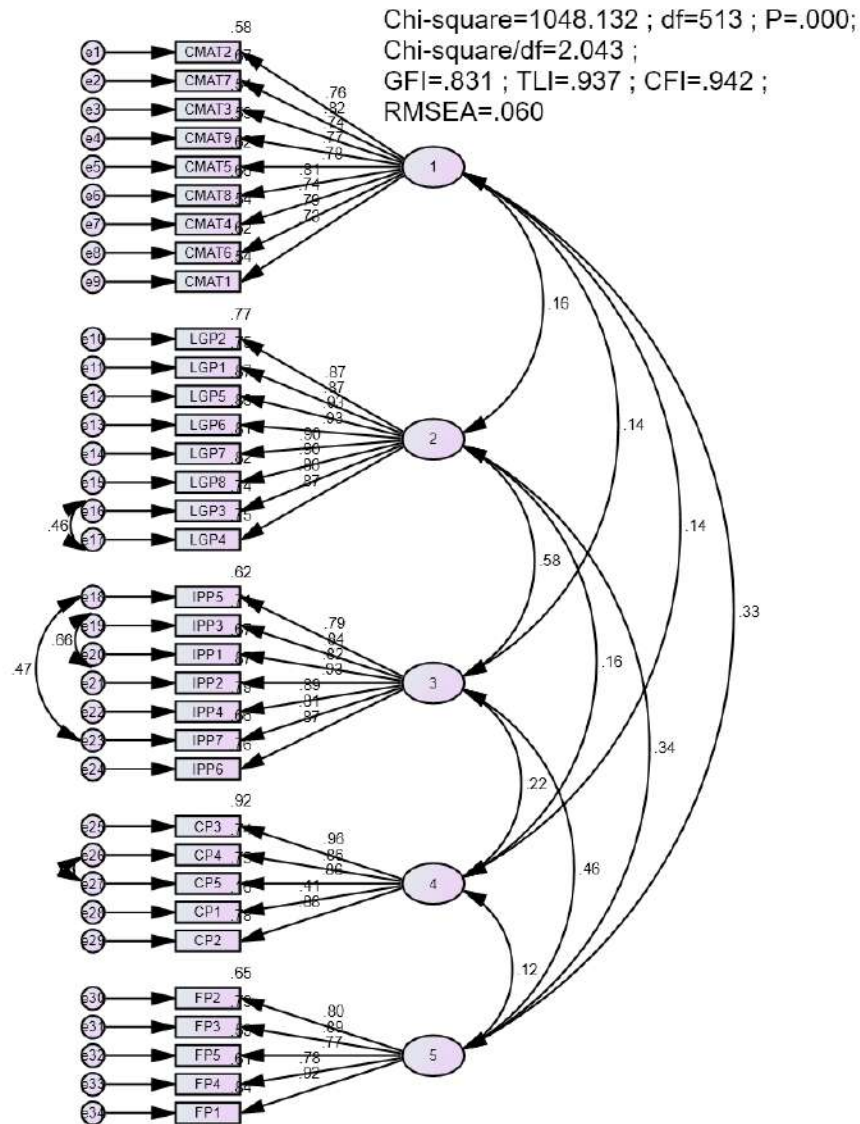


Fig. 2. CFA normalization diagram of research model

(Source: Processing by Amos software)

The standardized weights are more than 0.5 and the unstandardized weights are significant (sig. <0,000), so the concepts are convergent. This measurement model is appropriate for the research data and there is no correlation among the measurement errors, therefore achieving the property of unidimensionality.

5.2.4. Structural equation modeling (SEM)

5.2.4.1. Structural equation modeling (SEM) for H1

The study utilized SEM to evaluate the fit of the research model and test the relationships within the initial model. The SEM analysis result of the model with df = 515, Chi-square = 1001.204 with a p-value = 0.000 <0.05 , Chi-square/df = 1.944<3, GFI = 0.844>0.8, TLI = 0.943 and CFI = 0,948>0.8; RMSEA = 0,058 <0.08 confirms that the model is suitable for market data (Fig. 3).

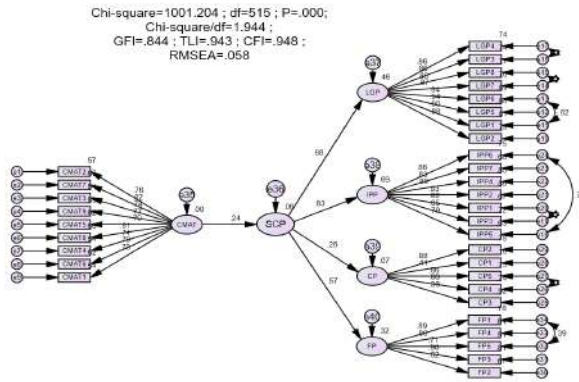


Fig. 3. Linear structural model 1 (SEM 1)

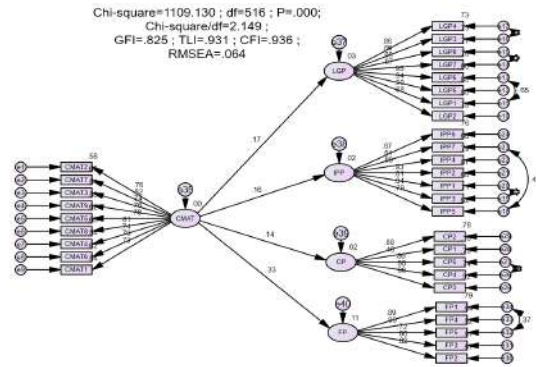


Fig. 4. Linear structural model 2 (SEM 2)

(Source: Processing by Amos software)

The model's regression coefficient outcomes indicate the P. value is 0.002 < 0.05; Therefore all hypotheses H1 are accepted (Table 6).

Table 6
Coefficients of SEM regression model and results of testing the model's hypotheses

Relations	Estimate	SE	CR	P	Conclusion
SCP ← CMAT	0.245	0.082	3.320	***	H1 - Accepted

(Source: Processing by Amos software)

5.2.4.2. Structural equation modeling (SEM) for H1a, H1b, H1c, H1d

The study utilized SEM to evaluate the fit of the research model and test the relationships within the initial model. The SEM analysis result of the model with df = 516, Chi-square = 1153.016 with a p-value = 0.000 < 0,05 , Chi-square/df = 2.253 < 3, GFI = 0.819 > 0.8, TLI = 0.929 and CFI = 0.934 > 0.8; RMSEA = 0.066 < 0.08 confirms that the model is suitable for market data (Fig. 4). The model's regression coefficient outcomes indicate the P. values are less than 0,05 ; Therefore all hypotheses H1 are accepted (Table 7).

Table 7
Coefficients of SEM regression model and results of testing the model's hypotheses

Relations	Estimate	SE	CR	P	Conclusion
LGP ← CMAT	0.173	0.101	2.801	0.005	H1d - Accepted
IPP ← CMAT	0.156	0.109	2.471	0.013	H1b- Accepted
CP ← CMAT	0.141	0.129	2.245	0.025	H1a- Accepted
FP ← CMAT	0.331	0.093	5.125	***	H1c- Accepted

(Source: Processing by Amos software)

6. Discussion

6.1. Findings

The current study provides empirical analysis on the impact of CMA Techniques on the SCP of logistics enterprises in Vietnam. Compared with previous studies, the contribution of the current study is to evaluate the impact of CMA Techniques on each component of SCP in a special business industry - the logistics industry, while most other studies focus on the impact of these factors on other industries or only general studies on companies within a country. In addition, the study has successfully built an SCP assessment scale based on the BSC model, while no research on businesses in Vietnam has been able to do this. Even so, the findings of this investigation are supported by previous empirical studies. The research results show a positive relationship between CMA Techniques and SCP of logistics businesses in Vietnam, this is confirmed by the fact that hypothesis H1 is accepted in the SEM model with an estimate of 0,245. Therefore, the better CMA Techniques are applied, the higher the SCP and vice versa. Although the impact level is small, this result does not contradict the results of previous research and is completely consistent with the actual situation in logistics enterprises in Vietnam (Dobroszek et al., 2020; Almatarneh et al., 2022; Doktoralina & Apollo, 2019; Hasyim & Jabid, 2019). The SEM model also shows the impact of CMA Techniques on each element that constitutes the SCP of logistics businesses in Vietnam. Specifically, CMA Techniques has a positive impact on the following factors: Customer perspective, Business processes perspective, financial perspective and learning and growth perspective. Among them, CMA Techniques has the strongest impact on the financial situation with an estimate of 0,331. This can be explained by the fact that CMA Techniques focuses more on cost control,

helping companies cut costs and improve profits, thereby improving the company's financial indicators. This is also completely consistent with the business characteristics of logistics enterprises. Transportation activities often take place outside the enterprise, so cost control is very important. If CMA Techniques are applied well, the first factor to improve is the financial situation. This result is also consistent with previous research (Hasyim & Jabid, 2019). CMA techniques also have the same impact on Learning and growth perspective, but the level of impact is lower with an estimate of 0,173. This proves that CMA Techniques provides useful information to support administrators in making decisions about human resources, business strategies, and technology investment decisions; thereby improving the efficiency of management methods and the ability to continuously improve and develop the business. CMA techniques also have an impact on the process, but the level of impact is lower than the above two factors, with an estimate of 0,156. This proves that CMA techniques have a positive impact on process efficiency, processing time, flexibility, transparency, collaboration, waste reduction, and efficiency and the integration of enterprise processes. This result is consistent with previous research results (Pradhan et al., 2018; Mohd Jamal et al., 2020). Although it brings significant effectiveness to the above factors, CMA Techniques has very little impact on the customer factor. The results of the SEM 2 model show that the estimate of this relationship is at the lowest level of 0,141. This shows that applying CMA Techniques has little impact on indicators related to the market, value added to customer, customer satisfaction, and level of customer interaction in the supply chain. However, CMA Techniques generally still has a positive impact on the components of the SCP of logistics businesses in Vietnam.

6.2. Policy implicate

Research results confirm the positive influence of CMA Techniques on SCP of logistics businesses in Vietnam; confirms the influence of CMA on customer factors, internal processes, finances, and the development ability of these businesses. This finding highlights several recommendations for the Vietnamese government. First, the government needs to focus more on creating legal conditions for businesses to apply modern CMA teaching methods in their operations, especially going deeper into CMA methods. The logistics businesses need to focus more on investing in CMA Techniques. Specifically, managers need to be clearly aware of the role of CMA Techniques in the performance of businesses and SCP. Managers must identify the need for cost information aimed at improving SCP, and from there, choose CMA techniques that suit the characteristics of business operations and meet their information needs well. At the same time, businesses also need to invest in modern technical facilities to meet the requirements of the CMA system. Accounting staff need to be intensively trained in CMA, fully understand the content of CMA to apply it effectively in businesses. Once the effectiveness of CMA Techniques is improved, financial efficiency, internal process efficiency, customer-related indicators efficiency, and business growth and learning also increase, thereby raising the SCP of the companies.

7. Conclusion

This study has explored the impact of CMA Techniques on SCP and SCP factors of logistics enterprises in Vietnam. This study analyzes data from accounting department employees and managers at large-scale logistics enterprises in Vietnam. The results have shown a positive relationship between CMA Techniques and the financial performance, effectiveness of internal processes, effectiveness of customer-related indicators, and the development and learning of the units. This is considered the newest point compared to previous studies. In addition, the study also points out recommendations for the government and logistics businesses in Vietnam to promote the application and effectiveness of CMA Techniques, contributing to improving SCP. Despite significant theoretical and applied contributions, this study still has some limitations. First, research on large logistics enterprises in Vietnam is in the same industry, business field, and same scale; therefore, the study found no difference between large enterprises and medium - small enterprises. Therefore, future research must take a broader perspective to provide deeper insights. Second, the research has not shown the impact of other factors on SCP at these enterprises, so there is no basis for providing a system of solutions that contribute to improving SCP more feasible. This may be a suggestion for the author's next research directions.

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Appendix 1

CONSENT FORM

“THE IMPACT OF COST MANAGEMENT ACCOUNTING TECHNIQUES ON SUPPLY CHAIN PERFORMANCE – USING BALANCED SCORECARD APPROACH: A CASE OF LOGISTICS COMPANIES IN VIETNAM”

I, (participant's name), agree to participate in the research project titled “The impact of CMA Techniques on Supply Chain Performance – using Balanced Scorecard Approach: A case of logistics companies in Vietnam” conducted by Dr. Anh Dang who has discussed the research project with me.

I have received, read and kept a copy of the plain language statement. I have had the opportunity to ask questions about this research and I have received satisfactory answers. I understand the general purposes, risks and methods of this research.

I agree to participate in the research project and the following has been explained to me:

- The research may not be of direct benefit to me
- My participation is completely voluntary
- My right to withdraw from the study at any time without any implications to me
- The risks include any possible inconvenience, discomfort or harm as a consequence of my participation in the research project
- The steps that have been taken to minimize any possible risks
- Public liability insurance arrangements
- What I am expected and required to do
- Whom I should contact for any complaints with the research or the conduct of the research
- I am able to request a copy of the research findings and reports
- Security and confidentiality of my personal information.

In addition, I consent to:

- Audio-visual recording of any part of or all research activities (if applicable)
- Publication of results from this study on the condition that my identity will not be revealed.

Name:

Signature:

Date:

Appendix 2

QUESTIONNAIRE

My name is Anh Dang, I am currently conducting research: “ The impact of Cost Management Accounting Techniques on Supply Chain Performance – using the Balanced Scorecard Approach: A case of logistics companies in Vietnam”. You are currently working at a logistics business; I'm so grateful to have your support by answering the questions below. Your opinion will help me a lot in assessing the impact of CMA Techniques on Supply Chain Performance at your business. The information you provide is only for scientific research purposes, is confidential and is not used for any other purpose.

Thank you very much for your help and cooperation!

A – GENERAL INFORMATION ABOUT PARTICIPANTS AND BUSINESSES

1. Name of the company :

2. Company's address:

3. Your Full name:

4. Your gender Male Female

5. Your age Under 35 From 36 to 50 Over 50

6. Your department:

Enterprise management Accounting/Finance Other

7. Your education qualification:

Bachelor Degree Master Degree Other

B – Assessing the impact of Cost Management Accounting Techniques on Supply Chain Performance

Please answer the question by marking a cross (X) in the box according to the levels: Level 1, Level 2, Level 3, Level 4, Level 5. For each question, mark a single box according to the level that you choose.

(1) Very bad or not used

(2) Bad

(3) Normal level

(4) Good

(5) Very good

No	Description	1	2	3	4	5
CP	Customer perspective in supply chain					
CP1	Level of market share					
CP2	Customer value added					
CP3	Customer interaction on processes					
CP4	Level of customer satisfaction					
CP5	Customer retention strategies					
IP	Business processes perspective in supply chain					
IP1	Processes efficiency					
IP2	Response time					
IP3	Level of flexibility					
IP4	Level and extension of transparency					
IP5	Level of collaboration					
IP6	Level of waste reduction					
IP7	Level and extension of process integration					
FP	Financial perspective in supply chain					
FP1	Shareholder value					
FP2	Level of cost reduction					
FP3	Profitability in supply chain					
FP4	Earned value added					
FP5	Earnings before interests, taxes, depreciation and amortization					
LGP	Learning and growth perspective					
LGP1	Adequacy and extension of technologies					
LGP2	Adequacy of infrastructure to the new technologies					
LGP3	Level of horizontal integration (Information and Technologies)					
LGP4	Level of vertical integration (Information and Technologies)					
LGP5	Level of people competences					
LGP6	Adequacy to the compliance and legal requirements					
LGP7	Level of leadership engagement					
LGP8	Coordination effectiveness					
CMA	CMA Techniques					
CMA1	Attribute Based Costing					
CMA2	Life-cycle costing					
CMA3	Quality costing					
CMA4	Target costing					
CMA5	Value chain costing					
CMA6	Just in Time					
CMA7	Activity Based Costing					
CMA8	Throughput Accounting					
CMA9	Kaizen Costing					



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