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Factors Affecting the Application of Strategy Management Accounting in Vietnamese Logistics Enterprises

Thi Kim Anh VU¹, Bich Ha DAM², Thi Thuy Van HA³

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Abstract

Purpose This research aims to investigate factors affecting the application of *strategic management accounting* in Vietnamese Logistics Enterprises. **Design/Methodology/Approach:** Quantitative research was conducted and data was collected by sending questionnaires to 188 accountants and directors from Vietnamese Logistics Enterprises (including, transportation, warehousing and forwarding). 5 factors (namely: *size and organizational structure, technological advancement, and strategic management accounting implementing costs*) were selected to measure the application of *strategic management accounting (SMA)* in Vietnamese Logistics Enterprises (LEs) through correlation and regression analysis. **Results:** *The empirical findings show that there exists a significant association between these factors and the SMA application.* LEs have strongly supported the application of SMA as a tool to provide information for making their strategic decisions. The factors including size and organizational structure, technological advancement, SMA implementing costs, and strategy positively impact the SMA application in both financial and non-financial aspects. This finding helps the administrators realize the importance of SMA. **Conclusions:** This study provided an overview of SMA application and its benefits to enterprises. It helps managers have a better understanding of SMA and future directions for application. Moreover, the research results will be useful for managers to identify factors influencing their SMA practices and improve the current management process applied in organizations.

Keywords: Strategic Management Accounting, application, logistics enterprises.

JEL Classification: M41, L25, M49

1. Introduction

In recent year, the logistics sector has become an increasingly important part of the service industry (Ju, Cheng, & Jia, 2019) and contribute significantly to the national economic growth of many countries (Doktoralina & Apollo, 2019), especially developing countries like Vietnam (Phuong, Grant, & Menachof, 2020). However, the explosion of technology innovation leads to dramatically competitive pressure on LEs as technology implementation remains expensive, risky and challenging to achieve (Russel

& Hoang, 2004). Compared to other ASEAN countries, Vietnam's logistics efficiency is still inferior, Banomyong, Thai, and Yuen (2015) reported that both customers and LEs in Vietnam lacked an understanding of logistics service concepts. The most significant problem was service level capability, with lower efficiency levels compared to neighboring countries. Since 2017, the Vietnamese government has introduced a comprehensive proposal to boost the country's logistics services production and competitiveness by 2025. This proposal aimed to increase the growth rate of logistics services, lower the contribution of logistics costs to GDP, raise the country's LPI to the top

1 First Author, Doctor, Accounting Faculty, Trade Union University, Vietnam, Email: kimanhvt@dhcd.edu.vn

2 Corresponding Author, Doctor, Accounting and Auditing Faculty, Thuongmai University, Vietnam; Email: ha.db@tmu.edu.vn

3 Third Author, Associate Professor, Accounting and Auditing Faculty, Thuongmai University, Vietnam,

Email: van.htt@tmu.edu.vn

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50 or higher, and improve the logistics sector's contribution to GDP. This proposal would attract logistics infrastructure investments, leading to the more excellent capability of logistics services enterprises in competing on domestic and international markets (Dang & Yeo, 2018). Logistic companies are encouraged to strengthen management systems to promote logistic services by implementing new logistics, skilled human resources technologies, and efficient strategic management accounting.

In the globalization context, LEs are facing many challenges related to sustainable development, technological progress, fierce market competition, changes in management and limitations of capital funding (Collier & Nandan, 2010). According to Slagmulder (1997), in order for enterprises to survive and maintain their sustainable development, both financial and non-financial information should be taken into consideration. As a result, SMA is considered an effective management tool to support managers in performing management functions because it combines and emphasizes both financial and non-financial information in the decision making process of managers. In addition, SMA provides various tools, techniques, and internal information for budgeting, executive planning, performance evaluation and decision making. SMA practices are not standardized due to a wide variety of business models in the market as well as various application in each enterprise (Chowdhury, Habibullah, & Nahar, 2018). In increasingly dynamic environments, the establishment of strategically applicable information plays an essential role in formulating and implementing business strategies in logistics companies (Doktoralina & Apollo, 2019). The accountants need to provide effective strategic management and accountability that depends on various elements, such as size and organizational structure (Abdel & Luther, 2008; Lavia & Hiebl, 2015), implementing SMA costs (Hyvönen, 2007), personnel (Howcroft, 2017), technological advancement (Hyvönen, 2007; Abdel & Luther, 2008; Kalkhouran, Rasid, Sofian, & Nedaei, 2015; Kordlouie & Hosseinpour, 2018) and strategy (Hyvönen, 2007; Otley, 2016). Although several studies have been done to investigate the application of SMA in Vietnamese enterprises, there are minimal paper explores the issue of SMA implementation in logistic firms. Thus, this paper aims to investigate the factors that impact strategic management accounting practices to enhance Vietnamese logistic firms' profitability. We first (i) assess the necessity and ability to apply SMA in LEs according to the management functions of the managers and then (ii) forecast the determinants including size and organizational structure, the technological advancement, costs of implementing SMA, and strategy on the deployment of SMA in LEs. Our study has three significant contributions. First, LEs have strongly supported the application of SMA as a tool to provide information for marking their strategic decisions. Second, accountants and managers have achieved significant benefits in terms of

governance functions from SMA use. Third, factors such as size and organizational structure, the technological advancement, costs of implementing SMA and strategy have positive impacts on the deployment of SMA in both financial and non-financial aspects, causing sustainable development of logistic enterprises in the modern competitive environment.

The rest of the paper proceeds as follows. Section 2 discusses the literature review. The following section describes the methodology and data used in this study. Section 4 presents the research results, followed by the discussion of the findings. The last section concludes the paper.

2. Literature Review

2.1. Theoretical background of SMA

The increasing competition and globalization make the strategy more critical to every business, making SMA even more critical (Lord, 1996). In general, SMA is used to support decision-making and respond to changes in global strategy. SMA is becoming more flexible and depending on the activities of the organization. SMA models and theories are designed based on the scope of activities, business environment, and enterprises' resource capacity. Tomkins and Carr (1996a) argued that compared with traditional methods, SMA focused on the future rather than comparing historical results, which makes it contribute more to the corporate strategy. They also pointed out that collecting data from competitors, analysis methods, and accounting roles/processes also helped managers map out their strategies better (Tomkins et al., 1996a). Kordlouie and Hosseinpour (2018) confirmed that the management control system supports strategic investment decision making and is consistent with the corporate strategy.

In recent research, Langfield, Smith, Andon, Hilton, and Thorne (2017) stated that SMA played an important strategic role by contributing to the formation and implementation of corporate strategy and allowing managers to improve their enterprises' competitive advantages. Valančienė and Gimžauskienė (2007) concluded that SMA extended its role from integrating data to providing information for strategy implementation. SMA previously focuses on shareholders but now focuses on combining solutions targeting customers - employees - shareholders. These solutions aim to monitor, measure, and manage strategic advantage and future results by allocating strategy into relevant goals and specific metrics using strategy maps. Hyvönen (2007) and Otley (2016) stated that SMA had supported companies' strategic decision making dramatically and enhanced its profitability. SMA helps managers have a broader understanding of costs, classify costs according to functions or behaviour, and how cost allocation for each product and service is implemented.

Based on that information, budget reports and cost adjustments are made so that managers can make investment decisions. Sulaiman and Norhayati (2014) demonstrated the SMA would also have functions such as strategic planning, creating value for businesses, providing internal information to help managers navigate the future, developing human resources, and improving the qualifications of managers and accountants. Therefore, managers need to focus on building organizational structure, finding and taking care of customers, production size, business activities, financial and managerial capacity, and product quality.

As a tool to support the administrator, SMA must provide sufficient information for the implementation of each management function of the administrator at each management level (Hyvönen, 2007; Kosaiyakanont, 2011; Collier & Nandan, 2010). Thus, the SMA contents are measured in relationship with three key areas of management functions, including planning function, monitoring and evaluating functions, and decision-making functions.

First, Applying SMA in planning: management accounting provides useful information for the planning process (Collier & Nandan, 2010). The plans established by managers are usually in form of a budget. A budget report is an action plan that quantifies organizational objectives according to the financial objectives of the entity. Cadez and Guilding (2008) suggested that the SMA service strategic management function for long-term administration goals were to have a competitive advantage in the market. Moreover, competitive advantage will be obtained if the business reduces cost (low-cost leader) or the product has differentiation compared with the competition. Therefore, when preparing all kinds of long-term production and business plans/projects, SMA always focuses on how to provide the best costs, ensuring long-term economic benefits for enterprises, or minimizing risks in case competitors improve their competitiveness. Currently, SMA regularly uses two strategic production cost estimation techniques, including Target Costing and Lifecycle Costing. (Cadez & Guilding, 2008; Shah, 2011; Fowzia, 2011).

Second, applying SMA in controlling: Kosaiyakanont (2011), Collier and Nandan (2010), and Hyvönen (2007) pointed out that in order to help managers perform controlling function, the managerial accountants need to conduct specific tasks such as providing performance reports, listing all variances and evaluating performance. Management accounting analyzes variances between reality and plans or budgets occurring in the course of operation and production to improve the control system.

Third, applying SMA in evaluating: in order to the management to perform assessing function, strategic management accounting must evaluate the effectiveness of the whole enterprise and each department regarding financial and operational aspects. From a financial

perspective, strategic management accounting generally uses basic financial indicators to support the assessment of corporate financial performance and apply these indicators in each responsibility center (Nandan, 2010; Hyvönen, 2007). Thus, SMA often uses several techniques: (1) evaluating long-term financial performance: taking into account the time value of money or inflations when calculating financial effectiveness; (2) Benchmarking: comparing the financial and operational performance of an entity with its competitors in the market; (3) economic value analysis or shareholder value analysis (SVA/EVA). Using these techniques helps the company identify the optimal operating plan, compare its efficiency to the ideal benchmarks, aim for innovation, and emphasize the external strategic direction for competition (Cinquini & Tenucci, 2010). The application of SMA also brings competitive advantages for businesses, which will positively impact financial and non-financial performance, help businesses deploy an effective measurement system for each specific activity, and implement business strategies towards sustainable development (Valanciene & Gimzauskiene, 2007).

Finally, SMA provides information to assist senior administrators in defining the organization's goals and assessing whether the goals are achievable. Strategic information often has characteristics such as internal and external sources gather, high synthesis quality, long-term suitable, relates to the entire organization, including quantitative and qualitative information and uncertainty. The most commonly used SMA group of strategic decision-making techniques include strategic cost management, strategic pricing and value branding. Strategic cost management refers to the use of losses data based on strategic and marketing information for developing and defining high-level strategy, creating sustainable competitiveness. Strategic pricing involves the combination of competitive, financial and market decisions to achieving a profitable selling price (Cadez & Guilding, 2008). Value branding implements practical marketing methods that communicate and guide customers, thereby influencing long-term benefits and allocating resources to the most profitable brands (Roslender & Hart, 2006). Senior managers can utilize these techniques to make effective decisions related to the continue or stop of investment, production for a project; reforming part of the whole production process; holding or divesting investment capital; long-term project investing to constantly and continually seek to cut costs while ensuring optimal production capacity (Kosaiyakanont, 2011; Nandan, 2010; Hyvönen, 2007).

SMA implementation is affected by a variety of factors. Abdel and Luther (2008) surveyed the impact on the complexity of SMA application on 658 enterprises operating in the food and beverage industry in the UK with ten determinants, including corporate perceptions about

environmental instability, organizational structure, business size, the complexity of the handling system, advanced technical manufacture (AMT), Total Quality Management (TQM), Just in Time (JIT), business strategy, the strength of customer resources, perishability of the goods. The results showed that the degree of corporate perceptions about environmental instability, organizational structure, business size, ATM, TQM, JIT, and customer resources strength had positive impacts on SMA adoption. The study of Ahmad (2012) showed that the application of SMA in businesses was affected by the company's size, market competitiveness, the participation of business owners/managers and advanced technical manufacture (AMT).

Research of Anh (2012) on 220 large and medium-sized enterprises in Vietnam indicated that the enterprises with the fiercer competition, greater decentralization of management were more likely to use SMA tools, leading to higher financial and non-financial results. Van and Lan (2021) evaluated the impact of corporate characteristics, organizational structure, business strategy, market orientation, and IT techniques on SMA implementation in Vietnamese enterprises. The results suggested the significant effect of all examined factors on SMA deployment, but particular techniques of SMA are affected differently. Organizational structure, business strategy and

market orientation affected the implementation of the market-oriented SMA techniques. Meanwhile, corporate characteristics, organizational structure, market orientation, IT techniques influenced SMA techniques that focus on cost and operating efficiency assessment.

To summarise, previous studies have identified SMA as a tool to support managers in providing sufficient information for various management functions' performance at different management levels. Enterprises in each sector had specific characteristics that need a tailored SMA deployment. The purpose of our paper is to investigate the application of SMA in Vietnamese logistic enterprises. This study rigorously synthesizes factors affecting the SMA application in LEs to propose a testing model that adapts its management functions.

2.2. Hypothesis development

Researching the factors that influence the choice of applying SMA inherited the results of the review, this study selected and analyzed the factors that were appropriate to the characteristics of LEs, including (1) size and organizational structure; (2) costs of implementing SMA; (3) personnel; (4) technological advancement and (5) strategy. Details of the scales are summarized in Table 1 as follows:

Table 1: Variable measurement

Factor	Cod	Variables	Sources
Size and Organizational structure (ENTE)	ENTE 1	Revenue	Abdel et al. (2008); Lavia et al. (2015); Pavlatos, (2015); Cinquini et al. (2010); Cadez et al. (2008)
	ENTE 2	Number of employees	
	ENTE 3	Total assets	
	ENTE 4	Detailed level of regulations, implementation guidance and performance assessment for each assigned task	Pavlatos (2015); Lavia et al. (2015)
	ENTE 5	The level of clarity of the division of responsibilities and powers between departments and individuals	
Costs of implementing SMA (COST)	COST 1	Costs of investing in technological advancement to implement SMA	Hyvönen (2007)
	COST 2	Costs of consulting experts about SMA	
Personnel (PERS)	PERS 1	Knowledge: including the expertise and knowledge of accountants and enterprise managers about SMA	Howcroft (2017); Van et al. (2021)
	PERS 2	Skills: SMA requires the use of very sophisticated and modern techniques; this requires accountants and enterprise managers to have ability to adapt to changes, critical thinking, analytic skills	
	PERS 3	Attitude: Accountants and enterprise managers are required to have a positive, honest and responsible attitude when implementing SMA	
The technological advancement (TECH)	TECH 1	Enterprise purchases advanced computer systems	Hyvönen (2007); Abdel et al. (2008); Kordlouie et al. (2018); Kalkhouran et al. (2015); Rosli et al. (2014); Pavlatos (2015); Isa et al. (2005).
	TECH 2	Enterprise purchases accounting software integrated with other management software (ERP)	
	TECH 3	Information systems can connect departments in the enterprises	
Strategy (STRA)	STRA 1	The degree of change in the list of logistics services a company offers to the market over time	Hyvönen (2007); Otley (2016); Cadez et al. (2008); Cinquini et al. (2010)
	STRA 2	The enterprise's pioneering role in developing new logistics services or new markets within companies in the same industry	
	STRA 3	The enterprise's ability to react to the first signals of a market's need or opportunity	

Factor	Cod	Variables	Sources
The extent of application of SMA (SMA)	SMA 1	Apply SMA well to meet the informational needs for planning	Collier et al. (2010); Cadez et al. (2008); Shah et al. (2011)
	SMA 2	Implement SMA easily to meet the informational needs for controlling	Kosaiyakanont (2011); Collier et al. (2010); Hyvönen (2007)
	SMA 3	Apply SMA constantly to meet the information needs for evaluating	Nandan (2010); Hyvönen (2007); Cinquini et al. (2010); Valanciene et al. (2007)
	SMA 4	Apply SMA constantly to meet the information needs for making decisions	Cadez et al. (2008); Roslender et al. (2006); Osaiyakanont (2011), Nandan (2010); & Hyvönen (2007)

Size and Organizational structure (ENTE): Abdel and Luther (2008) and Lavia and Hiebl (2015) indicated that enterprises' size is assessed through criteria such as revenue, number of employees, and total assets directly related to the accounting system's complexity. The more the enterprises develop, the more problems related to information and communication control arise, so accounting information systems' requirements are higher and more complex. Many published research results also confirm that enterprise size positively impacts SMA techniques' level of application (Cadez & Guilding, 2008; Pavlatos, 2015; Cinquini & Tenucci, 2010). Firstly, large-sized organizations operating in many various fields tend to standardize processes and procedures and specialize in implementing each function. So, the content of SMA is also standardized across organizational divisions/departments. Secondly, large-sized organizations often have more clearly defined organizational structures. This leads to the content of SMA serving operational efficiency evaluation, such as accountability accounting, is used more. Thirdly, large-sized organizations often have complicated budgeting systems with the participation of many departments and individuals. Thus, the larger the organization, the more the content of SMA tends to be standardized and clearer. Pavlatos (2015) revealed that the more decentralized enterprises were with various management levels, the more they needed the support of SMA to make strategic decisions. The degree of decentralization in the organization affects the organization's characteristics of preparing and synthesizing management accounting reports. Also, organizing an enterprise in teams or groups affects the content of SMA in terms of performance evaluation. This requires SMA to evaluate the team's performance, group, and individual in the team group to have a suitable reward mechanism. Thus, for an enterprise with a complex structure, SMA contents related to planning, control and performance evaluation will be more complicated, and the content of SMA for each department is also more diverse. Therefore, the hypothesis H1 is proposed as follows:

H1: Size and Organizational structure has a positive relationship with the extent of application of SMA.

Costs of implementing SMA (COST): Hyvönen (2007) showed that costs are the factor that makes businesses hesitate and refuse to apply cost management accounting. Mainly, investment in a department specializing in management accounting is expensive regarding human resources, machinery, equipment and other related costs such as consulting costs and additional salary costs. Therefore, the hypothesis H2 is proposed as follows:

H2: The lower the investment costs to implement SMA is, the higher the extent of SMA application is.

Personnel (PER): In Vietnam's economic context, most businesses do not pay much attention to management accounting but focus mainly on financial accounting to meet the authorities' regulations at all levels rather than the actual corporate management needs (Van & Lan, 2021). Therefore, the application of SMA is challenging to be successful, or it is only applied in a limited scope if business managers are not aware of the benefits brought by the application of SMA techniques. One of the critical factors in the process of SMA is personnel, especially accountants and business directors. This study examines three aspects related to human resources, namely knowledge, skills and attitudes. The personnel need to be knowledgeable because the SMA concept is quite complex and contemporary. To apply SMA, businesses have to spend high initial costs for training and improving the accounting team's qualifications, rebuilding the system of collecting, processing, and presenting financial information. Concerning skills, SMA requires the use of very sophisticated and modern techniques, which requires accountants and managers to have an ability to adapt to changes, critical thinking, analytic skills (Howcroft, 2017). In terms of attitude, we evaluate positivity, honesty and responsibility when determining and presenting SMA. There are many controversial points of view about the impact of personnel factor on SMA application. LEs have a professional process of training personnel which is updated with new knowledge and business changes. So, LEs have appreciated their working environment with many good opportunities; the personnel are more qualified. These are the reasons why the factor of PER has a positive impact on the application of

SMA. Thus, the hypothesis H3 is as follows:

H3: There is a positive relationship between personnel and the extent of SMA application.

The technological advancement (TECH): According to Hyvönen, (2007), Rosli et al. (2014), and Pavlatos (2015), the more advanced and modern the information technology, the more the content of SMA tends to provide information to serve strategic management and towards non-financial information. In the high-tech age of modern production systems, managers consider value chain relationships no longer merely financial matters but non-financial and non-standard matters. Thus, the more advanced technology an enterprise applies in production and business, the more flexible, open, non-standard and non-financial the SMA content is. Information technology studied in this study is considered in two aspects, namely: technology and information technology. Technological development causes difficulties in cost allocation, performance evaluation and investment appraisal. Enterprise managers and accountants have to develop new accounting techniques to handle these arising problems (Kalkhouran et al., 2015). The application of new technologies in production also changes managers' information needs for making decisions (Isa & Foong, 2005). For information technology, several published studies show that the application of software, hardware, and the development of information technology staff helps enterprises have a better business advantage (Kordlouie & Hosseinpour, 2018). The quality of the information system has a positive relationship with the level of SMA application in enterprises (Rosli et al., 2014; Pavlatos, 2015). Based on published researches, information technology has a positive impact on the application of SMA in enterprises. Thus, the hypothesis H4 is as follows:

H4: There is a positive relationship between the technological advancement and the extent of SMA application.

Strategy (STRA): Otley (2016) concluded that business strategy had an apparent influence on the design of control systems. Based on available resources, enterprise owners set appropriate development goals. Therefore, each enterprise has its own development goals. The SMA of the enterprises with long-term development goals that focus on scaling, operating in many industries, and participating in a competitive market, tends to apply new and advanced contents for ensuring the provision of long-term information, controlling a wide range of operations, measuring overall performance and allowing enterprises to improve their competitiveness (Hyvönen, 2007; Cinquini & Tenucci, 2010). The research results of Cadez and Guilding (2008) also showed that companies applying Prospector Strategy or Deliberate Strategy had a higher rate of applying SMA than

companies that applied reverse strategies. Therefore, the pioneering and proactive business strategy has a positive impact on the application of SMA. Thus, the hypothesis H5 is as follows:

H5: There is a positive relationship between strategy and the extent of SMA application.

Based on the above hypotheses, regression equations reflecting the correlation between influential factors and the adoption of SMA in LEs as follows:

$$SMA_i = \alpha + \beta_1 ENTE_i + \beta_2 COST_i + \beta_3 PERC_i + \beta_4 TECH_i + \beta_5 STRA_i + \varepsilon \quad (1)$$

In which:

Independent variables: Firm size and organizational structure (ENTE); Costs of implementing SMA (COST); The technological advancement (TECH); personnel (PERC) and Strategy (STRA);

Dependent variables: the extent of application of SMA (SMA);

α is constant; β is a coefficient, ε is the residual, and i is the index of the observation.

3. Data and Methodology

3.1. Research sample

This study uses a convenience sampling method. The dataset is selected from 600 large and medium LEs in Vietnam. The sample is categorized into two groups following decree No. 38 of the Vietnam government. The first group consists of large scale enterprises with a total capital of over 100 billion VND or over 300 employees. The second group contains medium enterprises which have capital of less than 100 billion VND and turnover less than 300 billion VND or the total number of employees less than 100 people. A quantitative approach was conducted to data gathering and analysis (Creswell, 2009; Neuman, 2013). This study used a constructed questionnaire with 188 random individuals through an online survey. Equation (2) presents how the sample is randomly stratified.

$$n = (Nt^2 \times pq) / (N\varepsilon^2 + t^2 \times pq) \quad (2)$$

Where,

N: Total sample

n: Sample size

p: proportion of cases with exposure and $q_1 = 1-p_1$

q: proportion of controls with exposure and $q_2 = 1-p_2$

t: confidence coefficient $t = 95\%$ (look up in the Table of values of the reliability coefficient t (value $t = 1.96$)

ε : Range of sampling error does not exceed 7% ($\varepsilon = 0.07$).

Table 2: Survey sample

Enterprise	Number of enterprises sent the questionnaire	Number of enterprises answered the questionnaire	Number of questionnaires sent	Number of questionnaires received
Large enterprise	25	21	50	44
Administrator			25	22
Accountant			25	22
Medium enterprise	100	97	200	144
Administrator			100	72
Accountant			100	72
Total	125	118	250	188

We use the reliability of 95%, with the deviation of the sample does not exceed 7%, and the sample structure between large and medium companies of 80/20. The final sample consists of 125 enterprises (25 large enterprises and 100 medium enterprises) to send questionnaires. The formula determines the minimum number of samples in factoranalysis and regression analysis: $n \geq 50 + 8k$, (Hair, Anderson, Tatham, & Black, 2010) where k is the number of independent variables of the model. In this study, the number of independent variables included in the analysis is 16 observed variables, so the sample size needs to be higher than 178 observations. We distributed 250 questionnaires and collected 210 responses. After cleaning the data, the number of valid responses for analysis is 188, which meets factor and regression analysis requirements.

There are two groups of objects for data collection. Group 1 includes business executives (directors and finance directors), and group 2 includes accountants (chief accountants, heads of Finance and Accounting department, staff in charge of accounting, and accountants). The first group is those who directly implement SMA for enterprises. The second group is those who use SMA information to perform management functions. Both groups contribute to explaining the importance of this survey. We sent the questionnaires directly to participants or via email and google docs. Respondents come from a variety of logistics fields, such as transportation (56.25%), warehousing (22.4%), and forwarding (21.6%). The segmentation of the data sample is presented in table 2:

3.2. Research processing

This study applied both qualitative and quantitative research methods using two stages (Creswell, 2009). First, the qualitative method was conducted using the expert interview tool to identify the factors affecting SMA in LEs. The interview subjects are directors, chief accountants, and university lecturers. The purpose of the interviews is to

complete the gathered scales through the literature review. In this study, a total of 10 in-depth interviews were conducted. The questionnaire is designed in two parts. In part 1, we use a 5-level Likert scale (1-Strongly Disagree; 5-Strongly Agree) to answer 20 questions for assessing the factors affecting SMA adoption. Each factor organizes the questions, and in each factor, the questions are asked in various aspects. In part 2, the information about individuals and businesses participating in the survey was collected through the criteria of firm size, operating time, and the business sector.

Second, survey results were processed. We sorted and cleaned up the data collected, then used analytical tools for (i) calculating the average value of each variable and the variables; (ii) testing the reliability of the scale, (iii) Exploratory Factor Analysis (EFA); (iv) correlation analysis; and (v) multivariate regression analysis. Based on the analysis results, we provide discussions and recommendations on the application of SMA to LEs.

4. Research results

4.1. Reliability test (Cronbach's alpha)

Hair et al. (2010) suggested that Cronbach's alphacoefficient helped test the uniformity of observed variables on the same scale. This measure was calculated before the exploratory factor analysis to eliminate unsuitable variables. Therefore, it improves the reliability of the measured research concept. With Cronbach's alpha of 0.6 or more, the scale is usable. Besides, for observed variables to be satisfactory, the total variable correlation coefficient must be ≥ 0.3 . The variables with the total variable correlation coefficient <0.3 are considered unusable and should be excluded from the model.

The results of the reliability test are shown in Table 3 as follows:

Table 3: Scale reliability analysis

Variables	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Size and Organizational structure (ENTE): Cronbach's Alpha = 0,863				
ENTE1	15.35106	4.999	.684	.835
ENTE2	15.42021	4.683	.870	.785
ENTE3	15.49468	5.845	.405	.904
ENTE4	15.32447	5.279	.737	.824
ENTE5	15.38830	5.009	.774	.812
Costs of implementing SMA (COST): Cronbach's Alpha = 0,821				
COST1	4.1330	.212	.696	.
COST2	4.1436	.209	.696	.
Personnel (PERS): Cronbach's Alpha = 0,664				
PERS1	7.8936	1.101	.577	.424
PERS 2	7.9202	1.143	.500	.534
PERS 3	8.0904	1.409	.360	.708
The technological advancement (TECH): Cronbach's Alpha = 0,701				
TECH1	7.9468	.810	.658	.112
TECH2	7.9947	.711	.687	.014
TECH3	7.5479	1.436	.035	.961
Strategy (STRA): Cronbach's Alpha = 0,858				
STRA1	7.6383	1.505	.600	.922
STRA2	7.7553	1.341	.791	.747
STRA3	7.7553	1.277	.819	.718
The extent of application of SMA (SMA): Cronbach's Alpha = 0,705				
SMA1	7.6170	1.275	.616	.494
SMA2	7.6649	1.379	.548	.582
SMA3	7.7500	1.461	.414	.749
SMA4	7.8323	1.996	.768	.879

The reliability test in Table 3 shows that ENTE, COST, PERS, TECH, STRA, and SMA have Cronbach's alpha > 0.6, indicating these measures' reliability. Each variable has total correlations > 0.3; therefore, all items measuring variables are consistent and appropriate for the study. Thus, this study has five factors and 16 observed variables which are statistically significant.

4.2. Exploratory factor analysis (EFA)

Hair et al. (2010) argued that Exploratory factor analysis aimed to preliminary assess convergence value, unidirectional value and discriminant validity. This result was then used for multivariate regression analysis. The results of Exploratory factor analysis are shown in Table 4, 5.

Table 4: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.692
Bartlett's Test of Sphericity	Approx. Chi-Square	1747.476
	df	105
	Sig.	.000

KMO index (Kaiser Meyer Olkin) in the range of 0.5 – 1.0 is considered to be appropriate for factor analysis; Bartlett test satisfies the condition Sig ≤ 0.05 will prove that the variables in the population are correlated with each other; The KMO and Bartlett's test in Table 4 shows that the coefficient KMO = 0.692 > 0.5; this means the factor analysis was consistent with the research data. Furthermore, the Bartlett test in the table shows that Bartlett's test is statistically significant (< 0.05), indicating the suitability of EFA. Therefore, it can be concluded that the observed variables are related to the population.

Table 5: Rotated Component Matrix^a

	Component				
	1	2	3	4	5
ENTE2	.945				
ENTE5	.887				
ENTE4	.860				
ENTE1	.791				
ENTE3	.537				
STRA2		.944			
STRA3		.910			
STRA1		.674	.389		
TECH1			.922		
TECH2			.907		
PERS 1				.823	
PERS 2				.794	
PERS 3				.685	
COST2					.917
COST1					.904

Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 5 iterations.

In table 5, factor analysis results based on principal components analysis and varimax rotation show that groups of factors drawn from observed variables with loading factor coefficients are relatively high (greater than 0.5); therefore, these loading factors are significant.

4.3. Correlation analysis

We conducted a correlation test between the five independent variables and the dependent variable of SMA adoption. The dependent variable (SMA) is measured by three observed variables, namely SMA1 SMA2, SMA3 and SMA4. The mean values and correlation test result of 5 independent variables and 1 dependent variable (SMA). According to the table 6, when considering the correlation with the dependent variable of SMA, the independent variables of TECH, PERS, ENTE, COST and STRA all have Sig. values greater than 0.01. Therefore, the independent variables are correlated with the dependent variable. *. Correlation is significant at the 0.05 level (2-tailed).

Table 7: Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.928 ^a	.862	.858	.20620	.862	226.459	5	182	.000	1.806

Note a. Predictors: (Constant), TECH, PERS, ENTE, COST, STRA
 b. Dependent Variable: SMA

Pearson correlation coefficients of the variables range from 0.122 to 0.847, indicating the positive and quite close correlation between the independent variables and dependent variable, so it is reasonable to conduct multivariate regression analysis to predict the influence of factors on the SMA adoption.

Table 6: Correlations

		SMA	TECH	PERS	ENTE	COST	STRA
SMA	Pearson Correlation	1					
	Sig. (2-tailed)						
TECH	Pearson Correlation	.622**	1				
	Sig. (2-tailed)	.000					
PERS	Pearson Correlation	-.281**	-.165	1			
	Sig. (2-tailed)	.004	.096				
ENTE	Pearson Correlation	.847**	.059	.158	1		
	Sig. (2-tailed)	.000	.557	.117			
COST	Pearson Correlation	.646**	.073	.002	.176	1	
	Sig. (2-tailed)	.000	.471	.987	.079		
STRA	Pearson Correlation	.810**	.557	.122**	.921	.388	1
	Sig. (2-tailed)	.000	.216	.000	.735	.640	

Note: **. Correlation is significant at the 0.01 level (2-tailed).

4.4. Multivariate regression analysis

The multiple regression analysis is conducted between independent variables (TECH, PERS, ENTE, COST, STRA) with the dependent variable (SMA). The results are shown as follows:

In table 7, the results show that adjusted square coefficient $R^2 = 0.858$, indicating that the five independent variables can explain 85,8% of the changes in the application of SMA in LEs.

Table 8: ANOVA^a

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	48.145	5	9.629	226.459	.000 ^b
	Residual	7.739	182	.043		
	Total	55.884	187			

Note: a. Dependent Variable: SMA;
 b. Predictors: (Constant), TECH, PERS, ENTE, COST, STRA

Then, we conduct multiple linear regression analysis and use the Stepwise selection method by including the relevant independent variables into the model and removing the inappropriate variables. In this study, five independent

variables are accepted in the regression model. In Table 8, the Sig. The ANOVA test values are 0.00, less than 0.05, indicating the suitability of the regression model. This means that the factors of TECH, PERS, ENTE, COST, STRA have different levels of impact on the SMA application. In the next step, we analyze and test how each factor in the model affects SMA. According to the regression results in Table 9, the Sig. The model's values show that the regression parameters are significant with the confidence level of 95%, the Sig. Less than 5% is significant. Therefore, the SMA application depends on the following factors, and the regression equation predicting these factors is model 2 as follows:

$$SMA = 0.121 + 0.246 COST + 0.235 PERS + 0.230 ENTE + 0.141 TECH + 0.111 STRA \quad (2)$$

Table 9: Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics		
	B	Std. Error	Beta (β)			Tolerance	VIF	
1	(Constant)	.121	.263		.462	.000		
	ENTE	.910	.027	.230	33.391	.000	.980	1.120
	COST	.060	.036	.246	1.644	.002	.965	1.136
	PERS	.037	.030	.235	1.251	.001	.985	1.115
	STRA	.010	.030	.111	.337	.006	.770	1.299
	TECH	.038	.030	.141	.275	.004	.748	1.337

Note: a. Dependent Variable: SMA

➤ **Testing hypothesis**

The regression results in table 6 show that Durbin - Waston of SMEs= 1.806, indicating no autocorrelation. The regression results in table 9 show that VIF coefficients < 2.0, so there is no multicollinearity in the regression model.

5. Findings and Discussion

The size and organization structure is found to have a positive impact on SMA with $\beta = 0.230$. Our research results show that enterprise size is compatible with the feasibility level of applying SMA. Remarkably, the larger the enterprise size (shown through revenue, total assets, number of employees), the more independent and transparent departments have functions, the higher the likelihood of successful SMA application. This result is consistent with some previous studies, such as Abdel and Luther (2008), Lavia and Hiebl (2015), and Pavlatos (2015). Large-scale enterprises often have strong economic potential and high governance needs, which creates a premise for SMA application in LEs.

Costs of implementing SMA (COST) has the highest positive impact on the application of FVA ($\beta = 0.246$). The cost of applying SMA in LEs is compatible with its feasibility. Enterprises' requirement for the cost of technology investment for the implementation of SMA or enterprises' requirement for the cost of consulting from organizations/experts on the application of SMA increases the feasibility of applying SMA. Typically, an SMA system can be computerized depending on enterprises' economic conditions, the granularity of required information, and the benefits that information brings. One significant barrier to SMA application in LEs is the concern about the cost of applying SMA, while its benefits are difficult to measure. This result is consistent with previous studies of Hyvönen (2007).

Personnel (PERS), especially accountants and business directors, is one of the crucial factors in applying SMA. This study examines three aspects related to human resources, namely knowledge, skills and attitudes. In this study, the factor of human resources has a positive impact on the dependent variable of SMA; this factor has the second strongest impact level with the impact coefficient of $\beta = 0.235$. Our research results indicate that enterprises'

owners/executives and accountants have a relationship with the feasibility of applying SMA. Specifically, if they appreciate the usefulness of SMA technical tools, are knowledgeable about these tools, have a high demand for SMA application or accept a high cost of applying SMA, the feasibility of applying SMA increases. The study findings are in line with Howcroft (2017)'s research findings, where they reported a strong correlation between the perception (understanding) of SMA and the need for SMA of the owners/managers and the accountants of enterprises.

For the technological advancement (TECH) factor, the empirical findings show a positive relationship between the degree of technological advancement and the extent of SMA application with the impact coefficient is $\beta = 0.141$. LEs need to be equipped with modern functional and technical computer systems compatible with accounting software integrated with the enterprise resource planning (ERP) system. Along with that, the companies need an information technology system connecting departments in the companies to ensure cost information is processed and provided timely and regularly to meet enterprises' information needs. This result is consistent with previous studies of Kordlouie and Hosseinpour (2018), Kalkhouran et al. (2015), Rosli et al. (2014), and Pavlatos (2015). The last factor, STRA, positively impacts SMA with the impact level of $\beta = 0.111$. If enterprises apply one of the strategies, such as providing specialized logistics services by customers' flexible requirements, the likelihood of applying SMA is higher. Similar results are found from uncertainty theory and previous literature (Hyvönen, 2007; Otley, 2016; Cadez & Guilding, 2008; Cinquini & Tenucci, 2010). The competitive advantage of Vietnamese LEs can explain this as they are very flexible in their business operations, from pricing policy to types of logistics services and how to meet customers' requirements. However, the more flexible the business strategy is, the more LEs need to apply SMA technical tools to obtain relevant information for decision-making in diverse business situations.

6. Conclusion

SMA has played an essential role in the sustainable development of logistics enterprises in Vietnam. However, there exist significant disagreements within academia and industry about factors that drive the SMA application. Our study employs multivariate regression analysis for a sample of 188 accountants and directors from Vietnamese LEs to examine the effect of size and organizational structure, technological advancement, SMA implementing costs on SMA deployment. Overall, the results suggest three key insights. First, SMA provides an effective tool for providing information to support LEs in making their strategic

decision. Second, accountants and managers could gain significant benefits on the governance functions of SMA. Finally, factors including size and organizational structure, technological advancement, SMA implementing costs, and strategy positively impact the SMA application in both financial and non-financial aspects. This finding helps the administrators realize the importance of SMA. Thus the SMA will be deployed and applied with appropriate sustainable development techniques in a modern competitive environment.

To achieve the set strategic goals, enterprises' managers need to change their perceptions about SMA, considering SMA is not only a strategic management tool but also a tool to connect the vision of leadership and the activities of employees within the enterprise, encourage the profound application of SMA to improve the business performance. The selection of the appropriate SMA tools in each developmental stage of LEs is critical. SMA deployment in LEs requires a significant investment of capital, time and human resources. Therefore, each logistic supplying enterprise should research rigorously a tailored plan to bring SMA into practice based on their peculiar conditions. From a macro perspective, the local Government should introduce appropriate policies to encourage applying SMA to enhance Vietnamese enterprises' competitiveness.

Though the research is detailed and covers the relevant issues related to SMA application in Vietnamese LEs, there are still some limitations to the current work. Respondents were asked to assess the Likert scale for all variables listed in the questionnaire to measure variables that may result in data bias. Therefore, future research should expand data collection sources such as those collected from companies' internal records and interviews. The study only targets the logistic sector while leaving other business areas such as commercial enterprises, services, and construction without investigation. The avenue for potential further research concerns extending this research to other areas and specific industries. Due to the variety of factors that may affect the SMA application, future research may consider the inclusion of market-oriented factors and manager characteristics to provide a comprehensive picture of SMA application determinants.

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