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Factors influence the implementation of lean accounting in mechanical firms

Tran Thi Thu Thuy[1], Phan Thi Anh Dao[2], Dang Van Quang[3], Mai Thi Tam[4], Do Duc Tai[5*]
[1]University of Labour and Social Affairs, Vietnam; violetsdoll@yahoo.com (T.T.T.T)
[2]Banking Academy of Vietnam; daopta@hvnh.edu.vn (P.T.A.D.)
[3]Hanoi University of Business and Technology, Vietnam; dangquangtckt@gmail.com (D.V.Q.)
[4]Hanoi University of Natural Resources and Environment, Vietnam; Hanoi University of Industry, Vietnam; mttam@hunre.edu.vn; tammt.ncs@st.haui.edu.vn (M.T.T.)
[5]School of Economics, Hanoi University of Industry, Vietnam; taidd@haui.edu.vn; taiketoanquocte@gmail.com (D.D.T.).

Abstract: The purpose of this study focuses on quantitatively analyzing factors influencing the implementation of lean accounting at mechanical firms in Hanoi through the results of linear regression analysis with the support of SPSS software. We surveyed 560 employees working at mechanical firms in Hanoi, collecting 450 questionnaires, reaching a rate of 80.3%; after cleaning, 395 questionnaires met the standards for use in the next steps. The research results show that the seven identified factors all have a positive influence on the implementation of lean accounting in mechanical firms, in which the order of influence of the factors on the implementation of lean accounting in mechanical firms in decreasing order is qualification and awareness of accounting staff (KT), digital technology (CNS), level of competition (MDCT), qualification and awareness of managers (NQL), size (QM), cost of organizing lean accounting (CPTC), and management decentralization (PCQL). From the research results, the authors have proposed a number of recommendations to improve the implementation of lean accounting in mechanical firms, thereby contributing to the improvement of lean production and improving the business performance of mechanical firms in the coming time.

Keywords: *Accountant, Accounting, Digital technology, Lean accounting, Level of competition, Manager.*

1. Introduction

The 4.0 industrial revolution helps connect the world with information on standards, techniques, and technology for all the most developed countries in the field, helping Vietnam quickly access, learn, and innovate more. However, this is also a challenge for the mechanical industry and mechanical enterprises, because the construction of standards and techniques has not received due attention and is not synchronized with the support of state agencies' operations according to registered standards and regulations. Therefore, most mechanical firms have applied the achievements of the 4.0 industrial revolution to implement a lean production system. Therefore, the implementation of lean accounting in these firms has also been gradually implemented in recent years.

To adapt to changes in the business environment in the new context, mechanical firms in Hanoi, which are industries with low technological levels, need to orient their business strategies to create new competitive advantages and improve business performance. One of the effective management tools suitable for the current new context is lean accounting. Lean accounting is a flexible accounting system, including a set of flexible principles and practices, simulating lean production by providing appropriate control and measurement reports, disclosing information about activities that bring value to customers by cutting costs, and eliminating meaningless processes at each level of production to reflect the best

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* Correspondence: taidd@haui.edu.vn; taiketoanquocte@gmail.com

financial performance of the company [1].

According to Maskell and Baggaley [2] implementing lean accounting brings many benefits to firms, such as contributing to preventing waste and loss occurring in the production process of the firm, thereby reducing costs and increasing profits; (ii) the use of lean accounting tools in firms contributes to improving capacity to achieve sustainable advantages and improve production performance and business performance. Therefore, today many managers and researchers have acknowledged the importance of lean accounting for the sustainable development of firms. Lean accounting reflects business strategy; information is collected and presented in a simple and intuitive way [2].

However, lean accounting has higher requirements, so when implemented, it also requires certain conditions. In addition, the implementation of lean accounting in firms is also affected by factors inside and outside the firm.

2. Theories and Research Hypothesis

2.1. Size

Many studies related to determining the factors that regulate the implementation of management accounting in general and lean accounting in particular show that the size of the enterprise is one of the influencing factors. First of all, the sophistication and complexity of the accounting system depend on the size of the enterprise [3]. As the firm grows in size, the issues of communication and control are of particular concern, so the control and management process becomes more complicated. The larger the size, the higher the demand for a complex management accounting system with modern tools. To meet this, firms are required to apply new and more effective information systems, and applying lean accounting is a necessary choice. Moreover, the increase in the size of the firm leads to increased costs and time for information processing [3].

In addition, larger firms have more abundant resources, so they can apply more complex and expensive accounting methods and tools. However, it is also argued that small firms can more easily convert their accounting systems [4]

Businesses must realize that the entire organization must support the implementation of lean [5, 6].

Lean accounting is a recent addition to cost reduction strategies, according to Marghani, et al. [7] who also quantify the degree of difficulty and barriers in implementing lean accounting practices in Algeria's Al-Wadi state's economic institutions. The conclusion is that although the El-Wadi state of Algeria's economic institutions meet many conditions for implementing lean accounting, there are certain obstacles and difficulties that keep it from being used.

Hypothesis H1: Size has a positive influence on the implementation of lean accounting at mechanical enterprises in Hanoi.

2.2. Management Decentralization

Abdel-Kader and Luther [8] and Soobaroyen and Poorundersing [9] found that decentralization changes the application of management accounting in South Africa and the United Kingdom. The authors explained that managers at all levels in the enterprise will be more responsible when they are delegated more authority in planning, implementing and controlling all activities of the enterprise. This is the driving force that motivates managers to deploy the application of modern tools in business administration, especially lean accounting tools, to complete the assigned tasks.

In Vietnam, Doan [10] and Tran [11] both believe that management accounting has a very important function in evaluating efficiency, and this only makes sense when the assigned responsibility is linked to management decentralization, so in order to be able to apply lean accounting techniques, management decentralization in enterprises is necessary.

Hypothesis H2: Management decentralization has a positive influence on the implementation of lean accounting at mechanical firms in Hanoi.

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2.3. Qualification and Awareness of Managers

According to the Theory of Reasoned Action, Ajzen and Fishbein [12] pointed out that attitudes will motivate the behaviors to be performed. The attitude factor here will be the perception of the business administrator. The level and perception of the manager refer to the Board of Directors, Board of Management, and departmental leaders.

Managers are more willing to adopt contemporary accounting technologies, such as lean accounting, when they comprehend how beneficial they are for assessing company success.

Managers' awareness is essential for the successful implementation of management accounting. When putting management accounting into practice, managers must take the initiative and concentrate on documenting and evaluating management actions.

It may be said that the process of switching from an old organizational structure to a new one is time-consuming and challenging [13]. The business benefits most from lean [14].

According to Shehadeh and Al-Beshtawi [15] the most crucial factor is the availability of lean accounting tools that have an impact on raising the value of Jordanian industrial public shareholding businesses. The study made several recommendations, the most significant of which was that management of Jordanian industrial businesses develop well-organized plans and put into practice efficient tactics to support raising the company's worth and attaining excellence and profitability.

Hypothesis H3: Qualification and awareness of managers have a positive influence on the implementation of lean accounting at mechanical firms in Hanoi.

2.4. Qualification and Awareness of Accounting Staff

Accountants are the ones who directly design and operate the lean accounting system. Therefore, when talking about factors influencing the application of lean accounting, it is impossible not to mention this factor.

Oliver [16] found that management accountants play an integral role in organizational decision-making processes. While Brouthers and Roozen [17] concluded that by being customer-oriented, proactively analyzing business problems, coordinating departments, and centrally managing information, management accountants contribute to providing managers with more accurate and timely information.

Nyamori, et al. [18] assert that the involvement of accountants in strategic decision-making will help them better understand the information provided to firm management. This can lead to awareness in accounting innovation, implementing improvements in the accounting of the unit, and one of the innovations that can be implemented is the application of management accounting in general, lean accounting in particular, to collect market information and orientation outside the firm.

Many accountants are not used to having to interact frequently with executives, so they may not be comfortable in their expanded role as a strategic advisor [19]. The basic principle of lean is that anything that does not create value must be eliminated. This can include a lot of data, a lot of transactions, and a large number of reports currently produced by accountants [20].

Hypothesis H4: Qualification and awareness of accounting staff have a positive influence on the implementation of lean accounting at mechanical firms in Hanoi.

2.5. Cost of Organizing Lean Accounting (CPTC)

Firms that apply lean accounting will incur firm costs such as costs of hiring experts, costs of training accounting staff, recruitment costs, salaries, and bonuses for accounting staff.

Tran [11] affirmed that costs have a positive influence on the application of management accounting in small and medium enterprises in Vietnam.

In general, the primary objective of lean is to use the shortest lead time and cheap cost to provide a high-quality product or service [21].

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Rehman, et al. [22] used qualitative research methods. The research sample was Pakistan garment enterprises. The research results confirmed that 3 factors, including facility costs, accounting staff costs and consulting expert costs affect the implementation of lean accounting.

According to Alotaibi, et al. [23] the cement factory in Kufa serves as the research sample. It does not employ lean accounting practices and tools, which can reduce expenses without sacrificing product quality. Lean accounting practices and tools from the Kufa factory should thus be used since they increase the company's worth and satisfy customers.

In order to determine the degree of the barriers and difficulties related to implementing lean accounting techniques in economic institutions in the Al-Wadi state of Algeria, Mane and Buqsari [24] sought to identify lean accounting as a contemporary introduction to cost reduction. The conclusion is that although the El-Wadi state of Algeria's economic institutions meet many conditions for implementing lean accounting, there are certain obstacles and difficulties that keep it from being used.

Hypothesis H5: Cost of organizing lean accounting have a positive influence on the implementation of lean accounting at mechanical firms in Hanoi.

2.6. Digital Technology

There are two types of technology that firms need to pay attention to: (i) the production technology of the firm affects the type of accounting tools that the company's accountants will use [25] and investing in technology will strengthen the management control system [26]. (ii) Information technology system, because according to Galbraith [27] when a firm has modern advanced technology, it will have a superior advantage over its competitors because any firm that wants to improve its competitiveness must have information about related parties such as market, competitors, customers, etc., and know how to effectively process the collected information. Therefore, advanced and modern information systems help firms in the process of collecting, processing, storing and transmitting information quickly, accurately and appropriately to meet the requirements of administrators, promoting increased business performance, protecting the environment and enhancing the reputation of the firm.

According to Mohsin, et al. [28] who gave multiple examples of how lean and traditional manufacturing differed, the goal of lean is to cut down on waste within the company.

Hypothesis H6: Digital technology has a positive influence on the implementation of lean accounting at mechanical firms in Hanoi.

2.7. Level of Competition

Ezzamel [29] believes that the environment is a key factor in determining the design of a management accounting system in an organization because the enterprise must deal with raw materials, services, prices, distribution channels, product quality, product diversification, human resources, etc., with competitors.

Cooper [30] argues that to compete favorably, organizations must maintain an effective management accounting system, which includes lean accounting.

Kariuki and Kamau [31] looked at the implementation of management accounting in manufacturing firms in Kenya and found that the level of competition in the industry affects the implementation of management accounting in general and lean accounting in particular in manufacturing firms in Kenya.

Hypothesis H7: The level of competition has a positive influence on the implementation of lean accounting at mechanical firms in Hanoi.

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3. Methodology

3.1. Select A Primary Data Collection Sample

In this study, the authors used a quantitative research method combined with qualitative, including three steps: preliminary qualitative research, preliminary quantitative research and formal quantitative research. Preliminary qualitative research was conducted through in-depth interviews and group discussions with experts in the fields of lean manufacturing, management accounting and lean accounting at mechanical enterprises to explore factors affecting the implementation of lean accounting and adjust the scale of factors accordingly. Quantitative research uses a survey method by distributing survey forms directly or sending online survey questionnaires to businesses to collect primary data. The subjects interviewed are the board of directors or management board, department heads or deputy heads (production, business, human resources administration), chief accountants or general accountants, and accounting staff.

The sample selected in the preliminary quantitative study by the convenience sampling method with the subject being accounting staff at mechanical enterprises in Hanoi is 80 samples. For the official sampling, in the multivariate regression analysis, the minimum sample size required is calculated by the formula 50 + 8*m (m is the number of observed variables of the factors) [32]. Thus, with 39 observed variables, in this study, the minimum sample size must be 50 + 8*39 = 362 observations. Thus, to ensure objectivity and reliability, in this study, the authors selected the official quantitative research sample of 560 questionnaires, resulting in 395 valid samples for analysis.

3.2. Data Processing and Analysis Methods

Data collected from the survey questionnaire was processed using SPSS 20.0 software. Preliminary survey data was evaluated for reliability of the scale through Cronbach's alpha coefficient and EFA exploratory factor analysis. Data collected from the official survey questionnaire after evaluating the reliability of the scale through Cronbach's alpha coefficient and EFA exploratory factor analysis, we conducted correlation analysis and linear regression model analysis through SPSS software; the results were used to test the theoretical model and hypotheses.

3.3. Research Model and Measurement Scale of Variables

After studying the theoretical and empirical basis of domestic and foreign research works on factors affecting the implementation of lean accounting in mechanical firms and through surveying the opinions of experts, we determined the factors affecting the implementation of lean accounting in mechanical firms suitable to the characteristics of mechanical firms in Hanoi city, including size (QM) with 4 observed variables, management decentralization (PCQL) with 4 observed variables, qualification and awareness of managers (NQL) with 4 observed variables, qualification and awareness of accounting staff (KT) with 6 observed variables, cost of organizing lean accounting (CPTC) with 4 observed variables, digital technology (CNS) with 4 observed variables, and level of competition (MDCT) with 5 observed variables. In addition, the dependent variable, implementation of lean accounting in mechanical firms (THKTTG), includes 8 observed variables.

From the research hypotheses in part 2, we propose the following research model (see figure 1):

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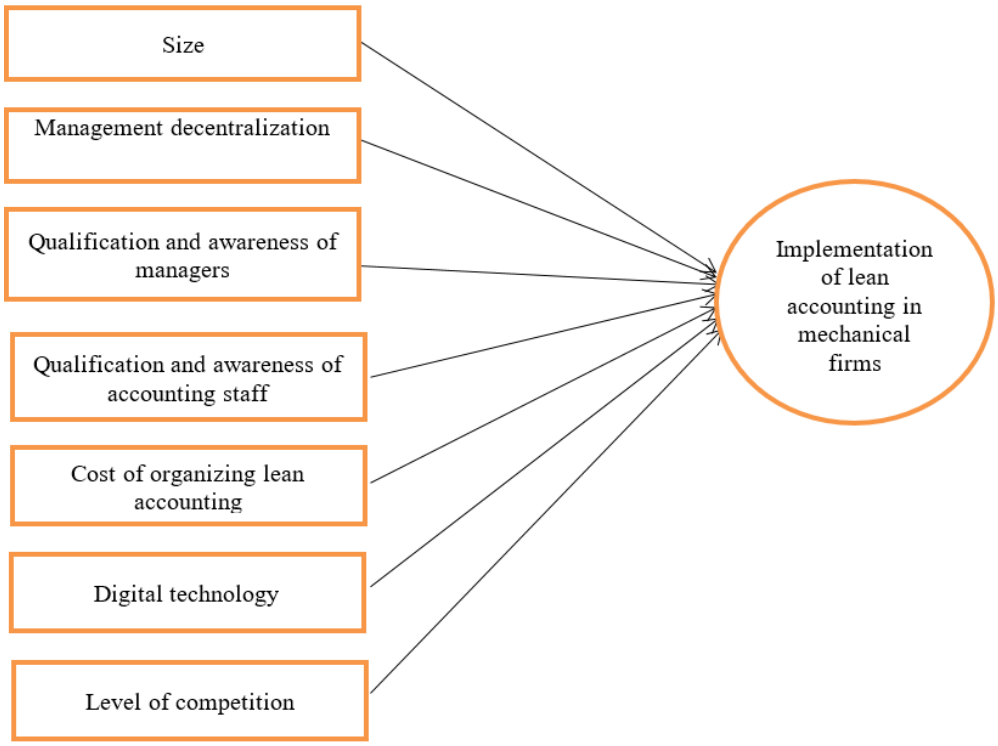

Figure 1.
Research model.

4. Results

4.1. Analysis of the Reliability of Observed Variables

An analysis of observed variables of factors influencing the implementation of lean accounting in mechanical firms in Hanoi was performed using Cronbach's Alpha reliability coefficient (see Table 1).

Table 1.
Results of the analysis: Cronbach's Alpha coefficient.

Description	Number of observed variables		Cronbach's Alpha	Corrected Item-Total Correlation
	Before	Later		
Implementation of lean accounting in mechanical firms (THKTTG)	8	8	0.942	0.710
Size (QM)	4	4	0.939	0.819
Management decentralization (PCQL)	4	4	0.942	0.762
Qualification and awareness of managers (NQL)	4	4	0.900	0.758
Qualification and awareness of accounting staff (KT)	6	6	0.908	0.682
Cost of organizing lean accounting (CPTC)	4	4	0.868	0.709
Digital technology (CNS)	4	4	0.903	0.730
Level of competition (MDCT)	5	5	0.854	0.565

The smallest item-total correlation coefficients of the scales are all greater than 0.3, indicating that all factors are dependable and suitable for EFA analysis. Table 1 also demonstrates that the dependent

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variable and the influencing factors (independent variables) all have Cronbach's Alpha coefficients greater than 0.6 [33, 34].

4.2. EFA Analysis

Varimax rotation and the factor extraction method of component analysis were used to conduct EFA analysis. Thirty-one independent variables were found in the analysis results (see Table 2).

Table 2.
KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**0.922**
Bartlett's Test of Sphericity	Approx. Chi-Square Square	8,880.15
	Df	465
	Sig.	0.000

KMO test = 0.922, as indicated in Table 2, satisfies the requirement that 0.5 < KMO < 1 and so makes exploratory factor analysis appropriate for actual data [33-35].

With a Sig.=0.000 <= 0.05, Bartlett's test indicates a linear correlation between the representative factor and the observed variables, demonstrating the relationship between the population's variables [33-35].

The extracted variance value is 74.940%, which means that the observed variables explain 74.940% of the change in the factors. This indicates that the data for factor analysis is appropriate. 7 factors have eigenvalues greater than 1; the number of component attributes (scales) of the extracted factor is 31, similar to the initial theoretical model. Thus, EFA analysis is appropriate for data and observed variables that are correlated with each other as a whole, so it should be used for the next analysis [33, 34].

Next, we have the rotated factor matrix. The results from Table 3 demonstrate that all of the factors' component variables tend to converge, with the factor loading coefficient ≥ 0.5 [33-35].

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Table 3.
Pattern Matrix[a].

Variables	Component						
	1	2	3	4	5	6	7
KT5	0.865						
KT4	0.861						
KT3	0.843						
KT6	0.818						
KT2	0.809						
KT1	0.784						
MDCT3		0.892					
MDCT5		0.878					
MDCT4		0.838					
MDCT2		0.694					
MDCT1		0.655					
CNS4			0.948				
CNS3			0.946				
CNS2			0.936				
CNS1			0.682				
QM2				0.993			
QM3				0.936			
QM1				0.893			
QM4				0.873			
NQL3					0.934		
NQL4					0.927		
NQL2					0.862		
NQL1					0.816		
CPTC3						0.871	
CPTC4						0.860	
CPTC2						0.856	
CPTC1						0.772	
PCQL3							0.997
PCQL2							0.933
PCQL4							0.871
PCQL1							0.662

Therefore, it is determined that there are seven factors influencing the implementation of KTTG in securities enterprises in Hanoi, as well as one dependent variable that represents the implementation of KTTG in securities enterprises in Hanoi with eight characteristic attributes (scales), based on the analysis of the scale's quality and the EFA model. The factors remain unchanged from before, based on the substance of the variables.

4.3. Correlation Analysis

According to Table 4's findings from the Pearson correlation analysis, the correlation coefficient is fairly high (ranging from 0.479 to 0.666), and the sig values for the Pearson correlation test between the dependent variable THKTTG and the seven independent variables—KT, MDCT, CNS, QM, NQL, CPTC, and PCQL—are all less than 0.05. Accordingly, these independent variables and the dependent variable have a linear connection [33-35].

Regression analysis is assured because there is no chance of collinearity between independent variables, as indicated by the correlation test sig values between independent variables being all less than 0.05 and the correlation coefficients between independent variables being all below 0.7 [33-35].

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Table 4.
Correlation analysis.

		THKTTG	KT	MDCT	CNS	QM	NQL	CPTC	PCQL
THKTTG	Pearson Correlation	1	0.657**	0.530**	0.587**	0.666**	0.624**	0.479**	0.594**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000	0.000	000	0.000
	N	395	395	395	395	395	395	395	395
KT	Pearson Correlation	657**	1	0.352**	0.369**	0.541**	0.461**	0.385**	0.487**
	Sig. (2-tailed)	0.000		0.000	0.000	0.000	0.000	0.000	0.000
	N	395	395	395	395	395	395	395	395
MDCT	Pearson Correlation	530**	0.352**	1	0.273**	0.377**	0.381**	0.212**	0.321**
	Sig. (2-tailed)	000	0.000		000	0.000	0.000	0.000	0.000
	N	395	395	395	395	395	395	395	395
CNS	Pearson Correlation	587**	0.369**	0.273**	1	0.448**	0.378**	0.256**	0.435**
	Sig. (2-tailed)	000	0.000	0.000		000	0.000	0.000	0.000
	N	395	395	395	395	395	395	395	395
QM	Pearson Correlation	0.666**	0.541**	0.377**	0.448**	1	0.538**	0.483**	0.500**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000		0.000	0.000	0.000
	N	395	395	395	395	395	395	395	395
NQL	Pearson Correlation	0.624**	0.461**	0.381**	0.378**	0.538**	1	0.346**	0.507**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000		0.000	0.000
	N	395	395	395	395	395	395	395	395
CPTC	Pearson Correlation	0.479**	0.385**	0.212**	0.256**	0.483**	0.346**	1	0.313**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	N	395	395	395	395	395	395	395	395
PCQL	Pearson Correlation	594**	0.487**	0.321**	0.435**	0.500**	0.507**	0.313**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	N	395	395	395	395	395	395	395	395

4.4. Regression Model Analysis

The findings in Tables 5, 6, and 7 demonstrate

Testing for multicollinearity: The model's multicollinearity is deemed not substantial if the variance inflation factor (VIF) of the six independent variables is less than two and the VIF of the remaining independent variable is between two and three [33, 34]. As a result, the linear regression model constructed using the equation above complies with all of the required linear regression assumptions.

The correlation of the residuals is tested using the Durbin-Watson coefficient, and the obtained Durbin-Watson value of 1.841 (which ranges from 1 to 3) indicates that the model does not contravene the multiple regression approach. Stated otherwise, the residuals' correlation phenomena is absent from the model [33, 34].

The developed multiple linear regression model is appropriate for the data set and usable, according to the results of an ANOVA test with a significance level (Sig.) of 0.000.

According to the coefficient R^2 (R Squared) = 0.731, independent variables chosen for the model will account for 73.1% of the variation in lean accounting implementation in mechanical enterprises; random errors and variables not included in the model will account for the remaining 26.9%.

The research model results indicate that the independent variables all have a statistically significant impact (due to Sig. < 0.05) on the implementation of lean accounting in mechanical firms.

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The standardized linear regression equation illustrates the following factors that influence the adoption of lean accounting in mechanical firms:

THKTTG = 0.241KT+ 0.233CNS + 0.199MDCT + 0.169NQL + 0.152QM + 0.117CPTC + 0.114PCQL

Table 5.
Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.855[a]	0.731	0.726	0.52343408	1.841

Note: a. Predictors (Constant): PCQL, CPTC, MDCT, CNS, KT, NQL, QM
b. Dependent Variable: THKTTG.

Table 6.
Anova[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	287.968	7	41.138	150.149	0.000[b]
	Residual	106.032	387	.274		
	Total	394.000	394			

Note: a. Dependent Variable: THKTTG
b. Predictors: (Constant): PCQL, CPTC, MDCT, CNS, KT, NQL, QM.

Table 7.
Coefficients[a] .

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-1.302E-16	0.026		0.000	1.000		
KT	0.241	0.034	0.241	7.091	.000	0.6042	1.6550
CNS	0.233	0.031	0.233	7.510	.000	0.7252	1.3789
MDCT	0.199	0.030	0.199	6.709	.000	0.7901	1.2657
NQL	0.169	0.034	00.169	4.957	.000	0.5955	1.6792
QM	0.152	0.037	0.152	4.064	.000	0.4983	2.0069
CPTC	117	0.031	0.117	3.822	.000	0.7400	1.3513
PCQL	0.114	0.034	0.114	3.356	.001	0.6036	1.6568

Note: a. Dependent Variable: THKTTG.

4.5. Discussion

All seven of the research hypotheses are statistically significant, according to the findings in Table 8.

Table 8.
An overview of the findings from the research hypothesis testing.

Hypothesis	Description		Expected direction	Conclusion
	Independent variable	Dependent variable		
H1	Size	Implementation of lean accounting in mechanical firms	+	Accepted
H2	Management decentralization		+	Accepted
H3	Qualification and awareness of managers		+	Accepted
H4	Qualification and awareness of accounting staff		+	Accepted
H5	Cost of organizing lean accounting		+	Accepted
H6	Digital technology		+	Accepted
H7	Level of competition		+	Accepted

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The influence of seven independent factors on the dependent variable is arranged in descending order as follows: qualification and awareness of accounting staff (KT), digital technology (CNS), level of competition (MDCT), qualification and awareness of managers (NQL), size (QM), cost of organizing lean accounting (CPTC), and management decentralization (PCQL).

4.6. Qualification and Awareness of Accounting Staff (KT)

Accounting staff is the main human resource involved in the implementation of lean accounting in mechanical firms. In fact, the implementation of lean accounting in a firm is carried out by people in that firm, especially the role of accounting staff. Accounting staff plays a key role in receiving and communicating appropriate information to managers. Therefore, the qualifications and awareness of accounting staff will contribute to the implementation of lean accounting. The connection between the accounting department and other departments in the mechanical firm also contributes to creating more reliable sources of information. The results of this study are consistent with the diffusion theory.

The KT2 scale was rated highest by respondents, at 3.67; the KT5 scale was rated lowest by respondents in the group, at 3.37.

4.7. Digital Technology (CNS)

The implementation of lean accounting in mechanical firms depends on digital technology, which is the result found in this study. In this study, digital technology is a key factor in the operating system of mechanical enterprises; the production process of mechanical enterprises is always based on advanced and modern production technology. The work of the accounting department is performed on computers with the support of software, and firms always prioritize investing in software to support other operations such as human resource management, business administration, sales, etc.

Digital transformation is one of the aspects of digital technology; it is a complex task, involving not only the accounting department in general and management accounting in particular, but also other departments such as information technology and other functional departments. Planning and implementing transformation for mechanical firms is not easy, requiring careful preparation. Each enterprise will have a different approach, but often their roadmap is unclear due to a lack of direction and guidance. To make digital transformation in management accounting in general and lean accounting in particular successful, some mechanical firms have followed a 6-step process including: Step 1: Determine the goals and strategies for digital transformation in management accounting. Step 2: Determine the level of readiness for digital transformation in management accounting. Step 3: Plan for digital transformation in management accounting. Step 4: Prepare the necessary conditions for digital transformation in management accounting. Step 5: Implement digital transformation in management accounting. Step 6: Evaluate and improve the process.

Digital technology consists of 4 scales; respondents rated the CDS2 scale the highest with a value of 3.13; CDS1 has the lowest value of 3.01 in the group. The results of this study are consistent with the diffusion theory.

4.8. Level of competition (MDCT)

The results show that the higher the level of competition in mechanical firms, the higher the implementation of lean accounting in mechanical firms. Competitive pressure is increasingly fierce and mechanical firms are facing pressure on investment resources to transform, innovate, and make breakthroughs. In fact, domestic mechanical firms are currently facing many challenges, and their competitiveness is weaker than that of mechanical enterprises in other countries in the region and in the world. Competition is inevitable for any enterprise operating in any industry, especially for mechanical firms that are always under pressure to compete in terms of raw materials, sales and distribution channels, product quality and price. In that case, gathering, evaluating, and processing competitiveness-

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related data from both inside and outside the mechanical company is essential to enhancing competitiveness, and putting lean accounting into practice helps to produce such accurate data. The study's findings are in line with the stochastic theory.

Respondents rated MDCT3 the highest with a value of 3.41; MDCT4 had the lowest value of 2.90 in the group.

4.9. Qualification and Awareness of Managers (NQL)

The findings of the study demonstrate that managers' awareness and credentials have a beneficial effect on the application of lean accounting. Out of the seven factors, this one has the fourth-strongest effect. If managers' awareness and credentials rise by one point, the application of lean accounting rises by 0.169 points, assuming all other parameters stay the same. The NQL1 scale is evaluated to have the biggest influence (3.7) among the scales (observed variables) of the factor of managers' qualifications and awareness, whereas the NQL2 scale has the shortest impact (3.52).

The level of awareness of managers with the lack of understanding or support of mechanical firm leaders will hinder the implementation of lean accounting. Managers are the highest decision-making level and have the greatest influence on all activities of mechanical enterprises, so managers have a great influence on the implementation of lean accounting in the firm. Implementing lean accounting in mechanical firms is easier if top managers have accounting expertise and are truly knowledgeable about accounting tools. The results of this study are also consistent with agency theory.

4.10. Size (QM)

The research results show that the size of the firm has a positive influence on the implementation of lean accounting in mechanical firms. In practice, observations at mechanical enterprises show that the size of the enterprise is also related to the way of organizing, designing and applying lean accounting contents to make decisions and is related to the level of sophistication and complexity of management accounting used in the enterprise. Mechanical firms with larger sizes (total assets, charter capital, resources, etc.) will generally have more complex lean accounting. In addition, large-scale mechanical enterprises have more resources to develop better lean accounting than smaller mechanical firms.

The QM4 scale was rated highest by the respondents at 3.67, and the QM2 scale was rated lowest at 3.52. The results of this study are also consistent with the contingency theory.

4.11. Cost of Organizing Lean Accounting (CPTC)

The research results show that the lean accounting cost factor has a positive impact on the implementation of lean accounting in mechanical firms. Thus, the lower the requirement for lean accounting cost, the higher the implementation of lean accounting. Under the condition that other factors remain unchanged, the lean accounting cost factor increases by 1 point, and the implementation of lean accounting increases by 0.117 points. Among the scales of this factor, the CPTC3 scale is rated the highest by respondents, reaching 3.21/5, and finally the CPTC1 and CPTC4 scales are both at the influence level of 3.06.

Although the cost of implementing lean accounting is low, experts also believe that it is necessary to calculate more reasonably the cost of implementation with the benefits of lean accounting and that the implementation of lean accounting is currently voluntary for mechanical firms. The results of this study are consistent with the diffusion theory.

4.12. Management Decentralization (PCQL)

The research results show that management decentralization has a positive influence on the implementation of lean accounting in mechanical firms, but the impact is the smallest compared to the other 6 factors. For large-scale mechanical firms, the impact of management decentralization on the implementation of mechanical enterprises is clearer than for small-scale mechanical firms, because in

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addition to facing fierce competition, small-scale mechanical enterprises will structure their management according to a centralized model to minimize costs, and therefore, even without decentralized management, the administrator is still responsible for planning and controlling the operations of the enterprise. The results of this study will be the basis to help managers in mechanical firms, especially small and medium-sized mechanical firms, improve the implementation of mechanical firms. The results of this study are also consistent with agency theory.

Among the four scales of management decentralization, the PCQL4 scale was rated highest by respondents at 2.96, and the PCQL3 scale was rated lowest at 2.82.

5. Implications

5.1. Recommendations for the Qualification and Awareness of Accounting Staff

The production and business activities of mechanical firms are quite complicated, reflecting costs through many stages with many items, so accountants should have in-depth expertise in management accounting in general and lean accounting in particular and should have a full understanding of the mechanical industry.

Accountants should fully develop soft skills such as teamwork skills, self-study ability, foreign language ability and information technology to meet the job requirements because in the increasingly competitive market conditions, international economic integration, and many multinational mechanical firms with strong potential require increasingly high quality of streamlined accounting information.

Accountants should perfect their professional ethics, always be dedicated to performing assigned tasks, and not violate ethical rules as prescribed by accounting laws and regulations of mechanical firms. In addition, accountants should also be careful when carrying out their work and maintain their commitments and efforts in each task to avoid providing misleading information or misinterpretation. To help accountants complete the above contents, right from the recruitment stage, mechanical firms should select candidate profiles with appropriate professional qualifications, the ability to learn, passion for the profession, and the ability to withstand high-intensity work pressure. In addition, mechanical firms should pay more attention to the remuneration of each position, create a more professional working environment, and create conditions for career development so that employees can stick with and devote themselves to the enterprise.

Mechanical enterprises should regularly re-evaluate the level of work satisfaction of accounting staff implementing lean accounting to foster and develop training to support them to keep up with practical requirements, especially in terms of the ability to exploit information technology applications to serve work in the current digital technology conditions. From there, lean accounting staff increase their ability to analyze, report, and advise managers in decision-making. In addition, to meet the application of international financial reporting standards (IFRS) with lean accounting according to the project of the Ministry of Finance, mechanical enterprises should proactively let accounting staff attend training sessions on the application of IFRS in general and lean accounting in IFRS in particular.

Accounting staff coordinating smoothly with other departments is one of the scales of this factor and also affects the implementation of lean accounting in mechanical firms. Therefore, mechanical firms should create a network of information links between the accounting department and other departments in the enterprise. Regular and timely information exchange between departments and between employees will help accountants have a more complete understanding of lean management (lean management associated with production, the important role of accounting in lean management, the dissemination and updating of concepts, benefits, tools, etc. of lean accounting). Internal communication channels between departments can be in the form of meetings, documents, emails, phone calls, etc., or groups can be formed on social platforms to discuss and exchange work status as well as make suggestions and recommendations. In addition, business administrators also need to regularly check and monitor to promptly detect and adjust any shortcomings in information exchange.

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5.2. Recommendations for the Digital Technology

Digital technology plays an important role in implementing lean accounting; it is a supporting tool to increase the speed of calculation and information provision, contributing to solving the difficulties in implementing lean accounting. Building a good digital technology infrastructure is one of the solutions that mechanical firms always aim for. Therefore, mechanical firms should invest in modern hardware with suitable processing and storage speed, internal network connection based on the Internet platform, and advanced software integrating many functions to support the feasibility and efficiency of implementing lean accounting: Big Data technology supports fast and simple processing of lean accounting operations, allowing quick access to data in a short time; blockchain allows the use of cryptography and distributed messaging protocols to create detailed accounting information according to lean accounting requirements. Cloud technology allows data storage, minimizing risks for lean accounting staff in storing accounting data. Investing in digital technology infrastructure is not only limited to the scope of accounting but should be synchronized with all activities in the mechanical firm, which will contribute to synchronous processing of mechanical firm activities.

5.3. Recommendations For Level of Competition

Vietnam is deeply integrating with the international economy; the competitive pressure is increasing, while the competitiveness of domestic mechanical firms compared to foreign-invested mechanical firms and foreign mechanical firms is still very low. Therefore, in order to survive and develop, mechanical firms should find ways to improve their competitiveness in terms of quality, price, product diversity, innovation, etc. With the quality factor, the most important factor in the mechanical field, mechanical firms should strictly control all input factors of the production process, such as raw materials, labor, machinery and equipment, production lines, modern technological processes, the production operation process, and the quality of final products. Regarding selling price, to have a competitive selling price, mechanical firms should use cost-effectively and economically by choosing raw material suppliers that ensure both quality and reasonable selling price; direct labor costs are strictly controlled; machinery and equipment are regularly maintained, ensuring quality and optimal use. At the same time, mechanical firms should combine methods of total quality management (TQM), the Kaizen method, the 5S process, etc., so that the production and business processes of mechanical firms are truly effective, ensuring product quality. In addition, all departments and divisions in the enterprise must be aware of improving work efficiency to help mechanical firms diversify products and distribution channels and enhance reputation and brand.

5.4. Recommendations for Qualification and Awareness of Managers

Implementing lean accounting in each mechanical firm also comes from the level and awareness of the manager. The research results show that this factor has a positive impact on the implementation of lean accounting in mechanical firms in Hanoi. Therefore, to implement lean accounting in mechanical firms scientifically, reasonably, and effectively, managers should have a more complete and correct understanding of lean accounting and the role of lean accounting information in managing and operating the enterprise's activities. Managers in mechanical firms should change their management thinking from traditional, experience-based to business management using modern management methods. From wanting to change and accepting change, managers will proactively update new knowledge by actively participating in training courses of prestigious educational institutions, training programs of the Ministry of Industry and Trade, Ministry of Science and Technology, etc on management skills or exchange programs between mechanical firms to raise awareness of lean management, lean accounting, the importance of lean management, lean accounting as well as learning from experience, thereby actively participating in supporting the implementation of lean accounting,

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accepting the costs incurred to implement lean accounting as well as accepting changes in some business activities to implement lean accounting to achieve the desired results.

Mechanical firm managers should have a burning desire and passion for developing Vietnam's economy and the Vietnamese mechanical industry to increase competitiveness in the global value chain.

5.5. Recommendations for Size

The scale and capacity of mechanical firms have been improved in most mechanical industries, from manufacturing complete equipment, manufacturing and assembling automobiles, manufacturing motorcycles, manufacturing hydraulic equipment, to manufacturing equipment for thermal power plants, equipment for the cement and construction materials industry, medical equipment, electrical equipment, and agricultural mechanics.

Human resources in other functional departments such as engineering, production management, human resources, business, workshops, etc. are also among the personnel implementing lean accounting. Therefore, mechanical firms should improve the qualifications and awareness of employees in departments that perform lean management and lean accounting tasks. Employees should ensure that their professional qualifications are appropriate to the functions and tasks of their positions, as well as receive basic training in lean management and lean accounting. Thereby, actively contributing to the implementation of lean accounting.

One of the lessons that the previous countries have applied is to build a high-quality workforce; encourage and create to develop strong mechanical firms, promote a generation of entrepreneurs with courage, with the aspiration to develop the Vietnamese mechanical industry in general, Hanoi in particular and develop the country's economy.

Total assets of a mechanical enterprise include short-term assets and long-term assets, in which long-term assets include machinery, equipment, production lines and production technology processes. Therefore, mechanical firms should calculate and review to invest in and upgrade machinery, equipment and production lines to thereby improve productivity and product quality.

5.6. Recommendations for Cost of Organizing Lean Accounting

Low costs of implementing lean accounting have a positive impact on the implementation of lean accounting in mechanical firms. However, mechanical firms should also pay attention to the organizational costs to ensure that they are always low and appropriate. Therefore, mechanical firms should organize training courses and detailed seminars combined with hiring experts to provide necessary knowledge and experience in implementing lean accounting for both leaders and accounting staff. In addition, mechanical firms can also learn from the experiences of foreign-invested mechanical firms, or mechanical firms that are multinational companies, to increase their understanding of lean accounting, thereby more fully implementing a new, more appropriate accounting system.

Mechanical firms should establish norms and plan for costs of facilities, costs of hiring experts, costs of recruiting and training accountants, and costs of accounting staff. Hiring experts, recruiting and training accountants should be assigned to the accounting department proactively and in coordination with other departments in the mechanical firm.

5.7. Recommendations for Management Decentralization

Departments in mechanical firms should be more fully diagrammed, describing functions, tasks and powers clearly to help decentralize the management of the enterprise more scientifically and reasonably. From there, support the streamlined flow of accounting information to be smooth. Depending on the characteristics, scale and strategy of each mechanical firm to build and complete appropriate management decentralization.

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Mechanical firms should allow departments and divisions within the enterprise to investigate, survey, analyze and discuss consulting opinions with the managers they are related to according to the regulations of the enterprise's board of directors.

The staff in departments, workshops, and production teams should correctly perceive that the staff authority is not the right to decide but to support and advise. The staff should have a basis, a foundation and comprehensive advice from identifying the topic and providing solutions. The mechanical firm manager should ensure that the staff has enough information and that the consulted departments listen to and use that information.

6. Conclusion

Theoretically, this is one of the studies that contributes to clarifying the theory in the research on lean accounting—one of the new fields, not yet studied much in Vietnam and still has many viewpoints; providing empirical research results on factors affecting the implementation of lean accounting in mechanical firms in Hanoi that no researcher has mentioned yet. In practice, the results of this study are useful references for researchers, mechanical firms in general, and mechanical firms in Hanoi in particular. Managers and accounting departments implementing lean accounting in mechanical firms should increase awareness of the role of lean management and lean accounting in saving costs, increasing profits and expanding scale.

Although some results have been achieved and the research objectives have been addressed, this study still has certain limitations, such as: To measure the observed variables (scales), respondents were asked to subjectively evaluate all variables listed in the questionnaire using the Likert scale. These evaluations are based on subjective judgment. In addition, respondents may not have a high level of understanding of lean accounting, which may reduce the quality of the research data. Therefore, future research should expand the data collection sources, such as collecting from internal records of mechanical enterprises and increasing the number of interviews and group discussions. In addition, this study has limitations in terms of the research sample: respondents who answered the survey questionnaire came from mechanical firms in Hanoi (Hanoi is one of the localities with many good policies for enterprises; enterprises in Hanoi are favorable in updating digital technology; favorable business environment, etc.), the sampling was non-probability, and the number of samples used for analysis was 395, so the research sample may not be large, leading to limitations in the level of generalization and reliability. Future studies should conduct stratified random sampling to ensure that the surveyed mechanical firms represent Vietnamese mechanical firms in the overall survey. Therefore, future studies should increase the number of research samples to ensure increased reliability.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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