

THE COMPATIBILITY BETWEEN LEAN ACCOUNTING AND CLEANER PRODUCTION FOR ACHIEVING COMPETITIVE ADVANTAGE

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Abstract: This study aim is to demonstrating the compatibility between lean accounting and cleaner production technology, as well as demonstrating their role in increasing productivity. The rationalization of cost and time, improving quality, promoting sustainability, creativity and energy conservation, providing a safe and clean environment for workers and minimizing waste in production process by identifying and analyzing activities and mapping the value stream for the current situation, to achieve the competitive advantage are also included in the aim of the study. For this purpose, data were collected from 500 manufacturing companies in Thailand. The managers of the accounts and production department are the respondent of the study. The result indicated that lean accounting increases the clean production within the organization and this clean production increase the competitive advantage of the organization. Thus, the adoption of various technological technologies by international industrial companies has played an essential role in creating a set of key features that enable them to achieve a competitive advantage, such as lean accounting and cleaner production technology.

Keywords: lean accounting, cleaner production, competitive advantage

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Introduction

Modernization of the business environment and quick changes in the environment of the business have generated the need for a number of other alterations in the business, such as e-commerce, conciseness of product life cycle, and market economy. So, these things create the pressure on the organization that they must adopt these changes to compete in the market by using different strategies such as restructuring the production process, providing faster information, reducing cost and other strategies that make the organization to cope with the changes in the business environment (Cooper, 2017).

The survival of the economic units on the market of international competition, the maintenance of their market share and the search for competitive advantage have stimulated these economic units to think strategically about their decisions, manage their business and industrial activities and apply a model that matches objectives such as reducing costs, increasing product quality, as well as adding more speed

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and flexibility in meeting market demands. Thus, the need emerged to make the system of operations in the economic unit attractive and able to adapt and respond to market requirements and eliminate all kinds of waste and loss of resources of the economic unit and work on regulating the production flow during that series, in a harmonious manner. That resulted in the emergence of lean accounting as a response to the market requirements and the achievement of competitive advantage, which was consistent with the research and innovation of the economic unit towards what was then called "environmentally friendly technology" (Powell, Alfnes, Strandhagen, & Dreyer, 2013).

This study examines the compatibility between lean accounting and cleaner production to achieve both competitive advantage and survival in a competitive market. The problem of the study is that most economic units continue with the same traditional methods of production and disregard the environmental effects and environmental pollution caused by frequent emissions associated with production processes. The lack of administrative awareness and the incomplete awareness of the importance of the compatibility between lean accounting and cleaner production technology and their impact on achieving competitive advantage is also the major issue.

Literature Review

Several previous literatures have been observed on lean accounting and the technologies of cleaner production. Lean manufacturing is a continuous improvement program and has become popular in the business world recently. Several well-known companies have developed and adopted lean practices (Fraser & Fraser, 2009). As a result, many administrative-accounting advocates have developed a new method of managerial accounting by the name of lean accounting. The term "lean accounting" has recently entered into the business after published a book entitled "Lean Accounting Applications" as a system for measuring and managing the lean economic unit in 2004. The manufacturers who implement lean manufacturing employ teams of skilled workers at all levels of the economic unit, apart from the use of machinery and equipment and advanced automated production of products that meet the customer's needs (Hines, Silvi, Bartolini, & Raschi, 2002). The modern concept of lean accounting has become used in the field of accounting only several years ago, as accounting has exceeded several stages since its inception to its 1980 arrival at the cost-based activities approach. In the latter period of time, the increased competition between companies has led to the emergence of modern methods and techniques to help companies reduce their costs, and lean manufacturing was the key to lean accounting. It is a system of accounting designed for lean production.

Several previous kinds of literature define the concept of lean accounting. Such as Kocamiş (2015) defined the "lean accounting as a modern business management style based on lean principles and methods that focus on financial information reporting to support lean production and focus on activities that add value and

eliminate the loss of the accounting system.” In addition, lean accounting is a sophisticated method of accounting that arises from focusing business attention on the culture of lean thinking that aims to measure the financial impact of implementing continuous improvement projects on economic unit operations (Nicholas, 2018, Urbański, Haque, & Oino, 2019). Moreover, “it as an accounting system that follows the consumption of resources that do not add value to the commodity and product from the customer's point of view, by using lean tools. It is also an accounting system that provides accurate, relevant and understandable information to stimulate and support the shift towards economic units and improved decision-making due to maximizing customer value, growth, productivity, and cash flow” (Man & Răvaş, 2017).

Cleaner production technology means significantly reducing the consumption of environmental resources, avoiding the use of highly toxic or environmentally harmful substances, and improving the efficiency of product design and production methods, thereby reducing emissions, discharges, and residues during the process of production, and waste recycling. Cleaner production is among the most prevalent methods of prevention in the world (Frondel, Horbach, & Rennings, 2007). More than one definition of cleaner production technology has been developed by the relevant associations, institutes, and writers, notably the definition by The United Nations Environment Program (UNEP) in 1990. “It is a continuous development of industrial processes, products and services aimed at reducing the consumption of natural resources and preventing pollution of air, water and soil at the source, to reduce the risks that humanity and the environment.”

Competitive advantage is an essential concept because it represents the goal that all business organizations seek to achieve. They must strive to gain competitive advantage commensurate with their potential and resources and do that while in constant competition with other economic units that share the same field of activity to preserve the competitive advantage and further develop it (David & David, 2019). And all of that because the present is the time of continuous development and competition that requires the economic units to obtain a competitive position in the market by choosing the opportunity to achieve the competitive advantage and apply it (Saeidi, Sofian, Saeidi, Saeidi, & Saaeidi, 2015). Several definitions of competitive advantage have all highlighted the importance of distinguishing the economic unit from its competitors. This can be achieved if the economic unit follows one of the leading competitive strategies (cost leadership, differentiation, and concentration), aimed at gaining competitive advantage in the field (Jones, Harrison, & Felps, 2018).

The competitive advantage can be achieved by applying the lean manufacturing and lean accounting system in the organization (Lewis, 2000). Furthermore, there is a positive link that has been found among lean accounting and the competitive advantage of the organization (Roslender & Hart, 2002). The lean manufacturing processes and lean accounting have significant demand in the organization to attain

a competitive advantage in the market (Habidin, Hibadullah, Mohd Fuzi, Salleh, & Md Latip, 2018). In addition, as far as the lean manufacturing processes and lean accounting system increases in the organization, the competitive advantage will also increase and vice versa (Cavallini, 2008). Moreover, the competitive advantage of the organization is the outcomes of the implementation of lean manufacturing processes and the lean accounting system within the organization (Baroma, Bellisario, Chirico, & Appolloni, 2013). Thus based on the above literature, it is clear the lean accounting system and lean manufacturing processes enhance the competitive advantage in the organization and this study also made the following hypothesis:

H1: There is positive nexus among lean accounting and the competitive advantage in the manufacturing firm of Thailand.

There is a positive link has been found among lean accounting and clean organizational production and its processes (Harris & Cassidy, 2014). The lean manufacturing processes and lean accounting have significant demand in the organization to attain a safe and clean business environment, clean production environment, product quality, and sustainable business environment (Helleno, de Moraes, & Simon, 2017). In addition, as far as the lean manufacturing processes and lean accounting system increases in the organization the safe and clean business environment, clean production environment, product quality and sustainable business environment also increases in the organization and this clean and safe production environment brings the competitive advantage feature in the organization. Moreover, the sustainable business environment, product quality and safe and clean business environment are the outcomes of the implementation of lean manufacturing processes and lean accounting systems within the organization, and these qualities help the organization to attain a competitive advantage in the market. Thus based on the above literature, it is clear the lean accounting system and lean manufacturing processes enhance the safe and clean business and production environment and this study also made the following hypotheses and theoretical framework presented in Figure 1:

H2: There is positive nexus among lean accounting and the cleaner production environment in the manufacturing firm of Thailand.

H3: There is positive nexus among cleaner production and the competitive advantage environment in the manufacturing firm of Thailand.

H4: The cleaner production environment mediates the nexus among the lean accounting and competitive advantage of the manufacturing firms in Thailand.



Figure 1 Theoretical Framework

Research Methods

The foremost purpose of the paper is to examine the impact of lean accounting on the competitive advantage with the mediating role of cleaner production. The production and accounts managers of 500 manufacturing companies in Thailand are selected based on convenient sampling. Around 960 questionnaires were distributed among the managers and after one month, only 745 valid responses were received that are approximately 77.60 percent response rate. Five-point Licker's scale has been used to answer the questionnaire for each response. The PLS-SEM was used to find the results from the data. The measurement scale of all the understudy variables is adopted from previous studies such as the dependent variable (competitive advantage), has five items, and mediating variables (cleaner production) has four items (de Guimarães, Severo, & de Vasconcelos, 2018). In addition, the lean accounting that is used as the independent variable has six items (Kennedy & Widener, 2008).

Results and Discussions

The finding includes the validity and reliability of the data that is verified by the “Alpha, composite reliability (CR) and Average Variance Extracted (AVE), Fornell Larcker and HTMT” while another part of the finding includes the path analysis in which we test the hypotheses. The convergent validity is verified in this paper because the loadings are higher than 0.70, Alpha of all the constructs are more than 0.70, CR also higher than 0.70, and AVE of all the constructs are more than 0.50. Table 1 and Figure 2 given below highlighted the convergent validity of the data.

Table 1 Convergent Validity

Constructs	Items	Loadings	Alpha	CR	AVE
Competitive Advantage	CA1	0.762	0.787	0.851	0.534
	CA2	0.820			
	CA3	0.715			
	CA4	0.679			
	CA5	0.666			
Cleaner Production	CP1	0.808	0.803	0.875	0.642
	CP2	0.561			
	CP3	0.895			
	CP4	0.894			
Lean Accounting	LA1	0.882	0.806	0.861	0.556
	LA2	0.777			
	LA3	0.727			
	LA5	0.658			
	LA6	0.660			

The discriminant validity is verified by using the Fornell Larcker and HTMT criteria. Table 2, given below, shows the Fornell Larcker criteria of discriminant validity. The statistics show that variables are not highly correlated because values are less than 0.90 and no issue with discriminant validity.

Table 2 Fornell Larcker

	CA	CP	LA
CA	0.731		
CP	0.626	0.801	
LA	0.592	0.849	0.745

The discriminant validity is also verified by using HTMT criteria. Table 3, given below, shows the HTMT criteria of discriminant validity. The statistics show that variables are not highly correlated because values are less than 0.90 and no issue with discriminant validity.

Table 3 HTMT

	CA	CP	LA
CA			
CP	0.756		
LA	0.651	0.789	

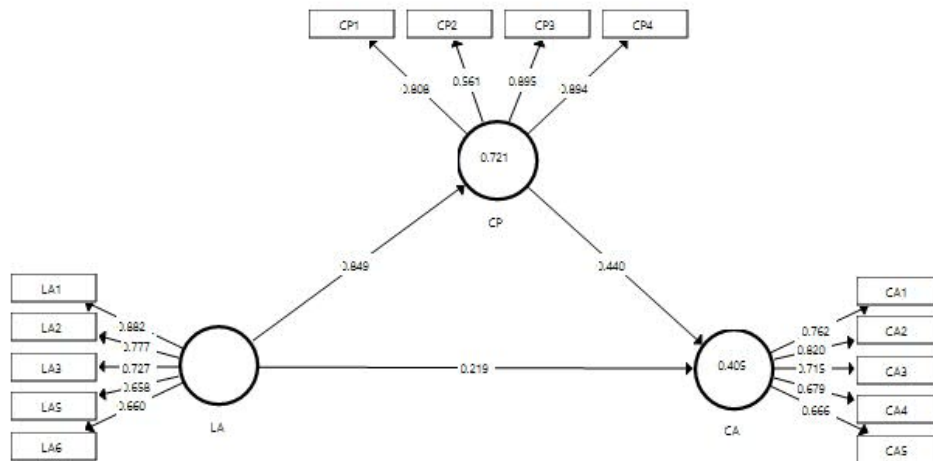


Figure 2 Measurement Assessment Model

The hypotheses of the study are tested by using the structural equation model (SEM) and the results indicated that lean accounting has positive nexus with a competitive advantage because the beta has a positive sign. In addition, the relationship between lean accounting and competitive advantage is significant because t values are higher than 1.96 and p values are less than 0.05 and accept the H1. These results are matching with the output of Hartini and Ciptomulyono (2015), who also found positive nexus between them. Moreover, results also indicated that lean accounting has positive nexus with cleaner production, and cleaner production has positive nexus with a competitive advantage because the beta has a positive sign. In addition, the relationship among lean accounting and cleaner production, cleaner production, and competitive advantage are significant because t values are greater than 1.96, and p values are less than 0.05 and accept the H2 and H3. These results are matching with the output of Ramos, Ferreira, Kumar, Garza-Reyes, and Cherrafi (2018), who also found positive nexus between them. Finally, findings also exposed that cleaner production mediates positively among the nexus of lean accounting and competitive advantage. Table 4 and Figure 3 highlighted that all the path analysis given below:

Table 4 Path Analysis

	Beta	S.D.	t-values	p-values	L.L.	U.L.
CP -> CA	0.440	0.110	4.010	0.000	0.250	0.611
LA -> CA	0.219	0.097	2.269	0.012	0.072	0.388
LA -> CP	0.849	0.017	50.705	0.000	0.823	0.877
LA -> CP -> CA	0.373	0.095	3.943	0.000	0.215	0.527

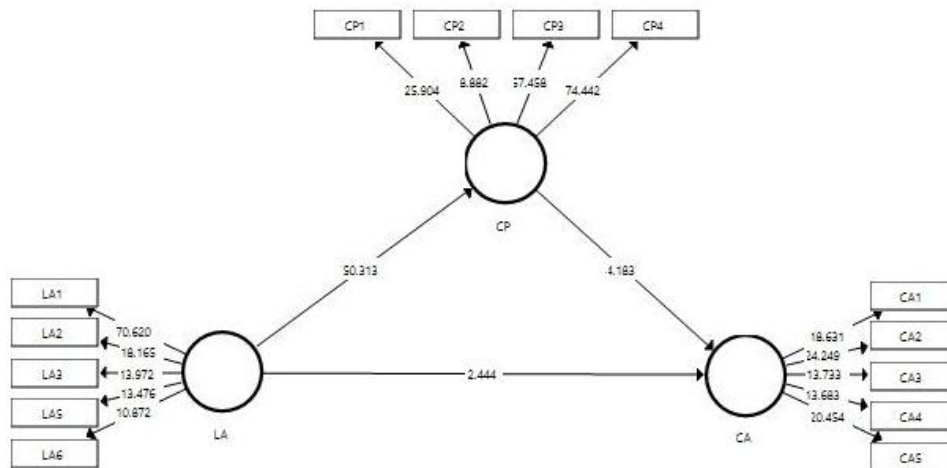


Figure 3 Structural Assessment Model

Conclusion

Finally, this study concluded that lean accounting provided a safe and clean environment to the organization that they increase productivity and rationalization of cost and time, improving quality, promoting sustainability, creativity, and energy conservation, providing a safe and clean environment for workers and minimizing waste in the production process. In addition, the current study also determined that the clean environment improves the competitive advantage in the market. Thus, if the organization implemented lean accounting, it enhances the cleaner production that ultimately increases the competitive advantage of the organization in the market.

The current study has few but considerable limitations that are become the direction for upcoming researchers. This study takes only one factor, such as lean accounting to predict competitive advantage and prospective studies may add more factors in their studies. In addition, cleaner production used as mediation in the study, and further studies may use it as a moderator. Finally, cross country analysis is ignored and upcoming research may add more countries in their examination and can be made a cross country analysis.

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ZGODNOŚĆ MIĘDZY RACHUNKOWOŚCIĄ LEAN I CZYSTĄ PRODUKCJĄ W CELU OSIĄGNIĘCIA PRZEWAGI KONKURENCYJNEJ

Streszczenie: Celem tego badania jest wykazanie zgodności między oszczędną księgowością a czystsza technologią produkcji, a także wykazanie ich roli w zwiększaniu wydajności. Racjonalizacja kosztów i czasu, poprawa jakości, promowanie zrównoważonego rozwoju, kreatywność i oszczędność energii, zapewnienie pracownikom bezpiecznego i czystego środowiska oraz minimalizacja odpadów w procesie produkcyjnym poprzez identyfikację i analizę działań oraz mapowanie strumienia wartości

dla obecnej sytuacji, aby osiągnąć Przewaga konkurencyjna jest również uwzględniona w celu badania. W tym celu zebrano dane od 500 firm produkcyjnych w Tajlandii. Kierownikami działu księgowości i produkcji są respondenci badania. Wynik wskazał, że Lean Accounting zwiększa czystą produkcję w organizacji, a ta czysta produkcja zwiększa przewagę konkurencyjną organizacji. W związku z tym przyjęcie różnych technologii technologicznych przez międzynarodowe przedsiębiorstwa przemysłowe odegrało istotną rolę w stworzeniu zestawu kluczowych funkcji, które umożliwiają im osiągnięcie przewagi konkurencyjnej, takich jak oszczędna księgowość i czystsza technologia produkcji.

Słowa kluczowe: oszczędna księgowość, czystsza produkcja, przewaga konkurencyjna.

精益会计与清洁生产之间的兼容性, 以实现竞争优势

摘要:本研究旨在证明精益会计与清洁生产技术之间的兼容性, 以及它们在提高生产率中的作用。通过确定和分析活动并绘制当前状况的价值流, 合理化成本和时间, 提高质量, 促进可持续性, 创造力和能源节约, 为工人提供安全清洁的环境以及将生产过程中的浪费最小化, 从而实现研究目的还包括竞争优势。为此, 从泰国的500家制造公司收集了数据。会计和生产部门的经理是研究的对象。结果表明, 精益会计增加了组织内部的清洁生产, 这种清洁生产增加了组织的竞争优势。因此, 国际工业公司采用各种技术技术在创建一套关键特性中发挥了至关重要的作用, 这些特性使他们能够获得竞争优势, 例如精益会计和清洁生产技术。

关键词:精益会计, 清洁生产, 竞争优势。