



Interactions, convergences and interrelationships between Lean Accounting and Strategic Cost Management: a study in the Lean Production context

Interações, convergências e inter-relações entre Contabilidade Enxuta e Gestão Estratégica de Custos: um estudo no contexto da Produção Enxuta

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Abstract: This article aimed to identify the lean accounting (LA) practices aligned with the strategic cost management (SCM) in companies of the industrial goods sector that work with lean production. It is a study of multiple cases accomplished in the second half of 2013. Data were collected through interviews, document analysis and observations *in loco*. Data analysis was given in a qualitative and a comparative way among companies. The main findings indicate that the surveyed companies continue to use traditional costing methods because they don't believe that more sophisticated methods will lead to a greater accuracy of information, contrary to the emphasized by the literature. In the same way, others LA practices, as value stream and visual management are less applied. It was observed that LA is a philosophy convergent with SCM. Some practices are shown to be aligned, as the quality cost, logistics cost analysis, *kaizen* cost analysis, value chain analysis, ABM (Activity Based Management) and BSC (Balanced Scorecard). We found that the practices of lean accounting do not unfavorably affect the use of SCM practices. Finally, companies are shown to joining lean production practices more than lean accounting itself, evidencing a gap in the literature on the subject.

Keywords: Lean manufacturing; Lean accounting; Strategic cost management.

Resumo: O objetivo do artigo é identificar o uso de práticas da contabilidade enxuta (CE) no alinhamento com a gestão estratégica de custos (GEC) em empresas do segmento de bens industriais que adotam a produção enxuta. Trata-se de estudo multicaso realizado no 2º semestre de 2013. Os dados foram obtidos por meio de entrevistas, análise documental e observações *in loco*. A análise dos dados ocorreu qualitativa e comparativamente entre as empresas. Os principais resultados indicam que as empresas seguem utilizando os métodos tradicionais de custeio. Isso ocorre pois acreditam que métodos mais sofisticados não levam a uma maior precisão das informações, contrariando o enfatizado pela literatura. Da mesma forma, o uso de outras práticas da CE, tais como fluxo de valor e gerenciamento visual, são pouco utilizadas. Observou-se que a CE é uma filosofia convergente com a GEC. Algumas práticas se mostram alinhadas, tais como custo da qualidade, análise de custo logístico, análise de custo *kaizen*, análise da cadeia de valor, ABM (Gestão Baseada em Atividade – do inglês Activity Based Management) e BSC (Balanced Scorecard). Constatou-se que as práticas da contabilidade enxuta não interferem desfavoravelmente no uso de práticas da GEC. Enfim, as empresas mostram-se mais aderentes às práticas de produção enxuta do que propriamente à contabilidade enxuta, evidenciando uma carência em relação à literatura que trata do tema.

Palavras-chave: Manufatura enxuta; Contabilidade enxuta; Gestão estratégica de custo.

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1 Introduction

Companies of various segments are adopting lean manufacturing strategies, a signal of involvement in dynamic and competitive environments. Therefore, not only their production process needs adaptation but also their cost accounting system in order to reflect the effects of changes. The focus of Lean Accounting (LA) is to align the information system with the strategies of a company, which arises as a result of the criticisms to management accounting (Fiume, 2002).

Lean production (LP) adopts principles, tools, and methods that have been gradually developed and implemented by Toyota, from the second half of the twentieth century, named Toyota Production System (TPS). The five principles of lean production consist of value, value chain, flow, pull production and perfection (Liker, 2005; Womack & Jones, 1998). Lean thinking must be bound to a business strategy, since all processes must support this strategy, such as accounting system, to ensure the existence of consistent and aligned information.

Assuming that the guidelines of lean thinking can be transferred to controls and information management, LA is prepared to control and generate information based on LP conceptions. Among conceptions, waste elimination and value creation are detached, leading to lean and transparent processes for the organization (Chiarini, 2012; Maskell & Kennedy, 2007).

The starting point for LA is the appropriation of lean thinking to the company as a whole. LA foundations are beyond factory sphere, as value chain changes the quality and generated benefits, which are evaluated from the measurement of the organization performance. The central idea of LA is to provide information necessary for decision-making, budgeting, and financial planning.

By approaching LA concepts to strategic cost management (SCM), convergences are identified. SCM seeks to make strategic elements more objective, explicit and formal, which leads to obtaining a sustainable competitive advantage. To meet its purpose, SCM is based on three key issues: value chain analysis, strategic positioning analysis, and cost drivers analysis (Shank & Govindarajan, 1997).

The point of convergence between LA and SCM is related to the significance of company strategies to create competitive advantages. Both criticize a traditional view of cost accounting, as they advocate of the need for adaptation to ever-changing environments and subject to greater competitiveness.

This convergence approaches LA and SCM. These control practices and information management can be used to guide managers, especially those that adopt a lean philosophy in business management. However, there is no unanimity on this aspect, but

a productive disagreement that focuses on a set of investigations.

On the one hand, Åhlström & Karlsson (1996), Canella et al. (2011) and Maskell & Kennedy (2007) point new accounting tools able to provide adequate information to lean environment and defend LA practice. On the other hand, Santos (2010), Slavov & Faria (2011) and Souza (2011) point LA application, practice and uses of SCM in companies with LP.

In this context, the established research problem is what is the use of LA practices and SCM and their alignment within the scope of LP? Therefore, this article aims at identifying the use of LA practices and its alignment with SCM. As a general contribution, it seeks to advance the LA studies, especially in the context of empirical applications, in order to raise theoretical reflections on the subject consistently to SCM.

The relevance of the study consists of two main aspects. First, from theoretical nature, the contribution is set to create a discussion of the alignment between two instruments available separately in literature for the management of companies, i.e. LA and SCM. While the first one is derived from the specific implementation of LP, the second is developed from the perspective of competitive advantage search and generic strategies due to new market settings (Shank & Govindarajan, 1997). This contribution is characterized by including the joined and aligned discussion of these instruments (LA and SCM), separately examined by the management literature. Second, from practical nature, is characterized by discussing the existing adherence in business practices considered by the literature as the most appropriate for LP situations. One of the possible questions is to identify if companies give the same importance to LP and LA. Study on this focus shows greater concern to operational practices than cost management (Souza, 2011). The article is structured by this introduction, the presentation of the theoretical foundation, the description of the used methodology and the data presentation and analysis. It ends with the conclusion and list of references used in the research development.

2 Theoretical reference

This section will present the main concepts concerning lean accounting and strategic cost management, including the characteristics of Fordist and Lean Production systems, and the context and relationships of lean accounting with Strategic Cost Management – SCM. This theoretical basis and studies related to the research support the article deployment and the analysis of convergences between lean accounting and SCM.

2.1 Fordist System and Lean Production System

Henry Ford has innovated industrial production with standardized practices of series production, achieving cost reduction through increased production volume. The efficiency was linked to a total control of all operations, in waste reduction, in standardization and control of availability and cost of the entire production chain (Ford, 1927). However, one of its competitors, General Motors, changed the production principles recommended by Ford, by the addition of a greater product diversification, without leaving mass production. The system was guided in products for all public types (Sloan, 2001). Foundations of Ford and Sloan were studied and improved by Japanese from their culture and unfavorable economic environment, leading to the development of the Toyota Production System (TPS).

TPS was designed in a resource scarcity context and inability to support production based on high volumes. Japanese was a narrower consumer market, requiring greater variability of models and reduced volumes.

This demand would only be feasible with the development of flexible production systems, which would lead quality improvement programs, *just-in-time* activities (to meet exactly what was asked at the right time and in the correct amount) and use of industrial automation resulting in increased productivity (Monden, 1999). In LP, the emphasis is focused on adding value for the customer. In any process, companies should concentrate its activities only in what adds value to the customer, removing all that does not add value, waste or loss, i.e., the non-cost principle (Liker, 2005; Womack & Jones, 1998).

Toyota adopts the non-cost principle since profit is due to sale price (determined by customer/consumer market) subtracted the costs. The non-cost principle has enabled Toyota to reduce sale price, or to elevate its profit margins, recognizing that “[...] only when cost reduction becomes the way to maintain or increase profits is that the company will be motivated to totally eliminate waste” (Shingo, 1996, p. 109).

In the Ford production system, the strategy for a competitive advantage stands on reducing costs, based on mass production. In turn, in TPS, the base is set on quality and flexibility, total quality control and flexibility to meet customer demands.

Figure 1 shows these production systems linked to competitive strategies and practices of SCM and LA. Some aspects of Lean Accounting are exposed next.

2.2 Lean Accounting (LA)

Assuming that guideline of lean thinking can be transferred to controls and management information, LA arises. Lean Accounting seeks to control and

generate information, highlighting the concepts of lean manufacturing, including information on the elimination of waste and value creation, leading to transparent and lean processes for the entire organization (Fullerton et al., 2013). The first discussions on LA issue were motivated by a group of speakers in the United States, where several specific works were originated (Maskell & Baggaley, 2006).

Lean Accounting is a term referred to changes made in the traditional way that companies perform, adapting to LP processes and signaling the need to implement this change also in support areas (Fiume, 2002). In this sense, LA should be adapted during or after lean manufacturing in order to accurately measure the new production system (Haber, 2008). By connecting lean thinking to a business strategy, all that company does, it have to support it, including an accounting system in order to ensure alignment with the strategy (Fiume, 2002). According to Fiume (2002), most people understand lean thinking as something restricted to production and it needs just its principles and tools implementation, such as *kanban*. To Fiume (2002), few companies understand that this proposal is a business strategy and not a manufacturing tactic unlinked from other areas from the organization.

This component is used to justify the LA implementation in companies that uses LP in its strategy and in its operational and management processes. When a company replaces mass production by lean production, the realignment of accounting to these changes is necessary, as traditional cost accounting systems are inadequate compared to lean production principles (Dias et al., 2007; Maskell & Kennedy, 2007).

The main contingent change promoted by lean accounting is the need to account gain and loss of performed activities. For this, an accounting system capable of structuring the accounting of the organization based on stream value is necessary (Maskell & Baggaley, 2006).

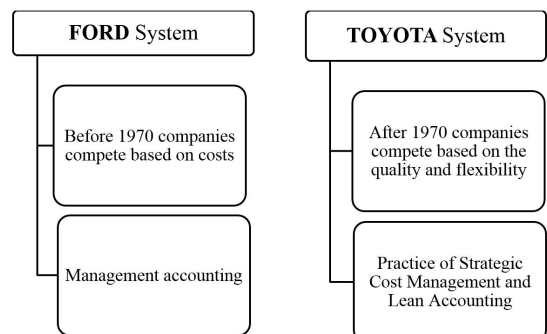


Figure 1. Characteristics of Ford and Toyota Production System. Source: adapted from Nakagawa (1991).

Thus, Lean Accounting is contextualized in order to direct its focus on controls and generation of information that motivate changes and improvements. Lean context implies that the information must be easily understood, be visual and low cost in its generation. In addition, it must be appropriate for decision-making, directed to the understanding of customer value and financial impacts provided by LP (Maskell & Kennedy, 2007).

Åhlström & Karlsson (1996) investigated the role of accounting management system in a process of change towards LP. The authors reiterate the importance of accounting system on tracking the process of change, implying changes in three perspectives: (a) to understand the limit from which performance indicators are not adequate and to create new indicators to support process of change; (b) to change the analysis unit, from individual to collective – measures that consider equipment and personnel utilization individually do not make sense; (c) to understand that adoption of changes in accounting system affects technically the process, whether for its role in the organization or in the comprehension of those involved about the changes. The presented concepts converge to generate useful and timely information, targets also present in SCM. Thus, it is necessary to expose the fundamental concepts of SCM, as it will be shown below.

2.3 Strategic Cost Management (SCM)

In 1987, Johnson and Kaplan presented arguments that disqualified management accounting systems to the context of business organizations, i.e., management accounting were no relevant. The arguments focused on growth and increasing complexity of the organizations; the influence of accounting information for external users in management accounting; greater importance given to cost accounting than cost management, and on academic omission on the subject. Such criticisms led researchers to reflect on the role of management accounting (Borinelli et al., 2005; Johnson & Kaplan, 1993; Noreen, 1987).

Johnson & Kaplan (1993) believe that the challenge and the opportunity to recover the relevance consist in the fact that management accounting systems can and should be designed to support operations and strategies of the organization. The system should be designed to provide timely and accurate information to facilitate cost control efforts, to measure and improve productivity and to identify best production processes. Therefore, it is observed the same ratio between LP and LA prior indicated.

The strategy is the heart of SCM, being seen in a broad context, where strategic elements become more conscious, explicit and formal and where data is used to develop superior strategies in order to achieve a sustainable competitive advantage (Shank

& Govindarajan, 1997). Accounting, with this wider perspective, seeks to facilitate the development and implementation of business strategy. Therefore, administration is seen as a continuous cyclic process: (a) to formulate strategies; (b) to communicate these strategies throughout organization; (c) to develop and to implement tactic for the strategies; (d) to develop and to implement controls for monitoring the implementation stages and the success in achieving goals. The accounting information is present in each stage of this cycle (Shank & Govindarajan, 1997).

The external environment of the company is exploited by SCM, which enables the understanding of the strategic alignment of the company and the elements that influence the value chain composition. In order to meet its purposes, SCM is based on three key themes: value chain analysis; analysis of strategic positioning; analysis of cost drivers (Shank & Govindarajan, 1997). The SCM expression became widespread in literature because it reinforced the need for conceptual improvement and management control practices, as inter-organizational relationships with suppliers and customers increase the competitiveness of company (Nixon & Burns, 2012).

After LA and SCM presentation, it is observed that some objectives converge. It is discussed in the next section the evolution of management accounting for SCM and its relationship with LA.

2.4 Practices of Lean Accounting and Strategic Cost Management

A lean organization, whose focus is to reduce costs by reducing waste, has no information to support LP guidelines (Canella et al., 2011). Regarding the LA Canella et al. (2011) state that the absorption costing method does not respond to the needs of lean reality, since this method focuses on financial accounting. Nakagawa (1991) understands that ABC costing method could be adopted and with good ability to contribute to the information system. In Japan, target cost and *kaizen* cost are widely used (Monden, 1999). Already in references in LP, as James Womack and Daniel Jones or specifically in LA, Brian Maskell, and Frances Kennedy, the authors advocate the cost control use by value stream as an alternative for lean production (Canella et al., 2011; Li et al., 2012).

The closest of the methods, known as a synergistic costing method with lean thinking is ABC. It is so because ABC enables cost analysis and seeks to track company costs to analyze and to monitor different consumption routes of the directly identifiable with their most relevant resources and, these, for products and services (Nakagawa, 1991). Linked to ABC, Nakagawa (1991) presents the Activities Based Management (ABM), as that linked to focused (simultaneous) vision of problems that occur at the

operational level, related to the value creation for customers, and that occur in a decision level from an economic nature, related to the optimization of returns on investment. This is also the understanding of Sakurai (1997, p. 97), which states “[...] the main purpose of ABC is providing to administrators information on product cost, to profitability analysis and other decisions”.

Regarding to ABM, Ching (1997) emphasizes the purpose of management of activities for the improvement of production and innovation process. The ABM system also includes improvements in internal activities, enhancing efficiency and eliminating all those activities that do not contribute to adding value to the customer (Ching, 1997). This ABM attribute is closely related to value stream applied in LA. According to Ching (1997), some of the advantages of ABM use are: (a) ease of the identification of redundant activities; (b) analysis of value and activities relevant to customer; (c) identification and quantification of quality costs of each element; (d) quantification and analysis of complexity costs; (e) greater understanding of cost drivers, and (f) quantification of costs and income based on activities, elimination of activities that do not add value.

Maskell & Kennedy (2007) criticize ABC due to its estimation on the cost of production, relating product costs with the drivers cost spent on the good production. For Maskell & Kennedy (2007), and according to LA principles, product cost will be dependent on the flow rate throughout the value chain, on the product mix produced during a period of time, on the volume of required product (pulled) by the customer and on the business issues that may occur during this period of time. Arbulo-López & Fortuny-Santos (2010) propose a simplified ABC or pre-ABC to follow LA implementation process. For Arbulo-López & Fortuny-Santos (2010) ABC serves to monitor companies that do not work with the mass production paradigm (contrary to LA). ABC method is contrary to LA principles when it consumes many resources for data collection, however, it is useful because production flow is considered and it helps to find waste sources and its effect on product cost. Arbulo-López & Fortuny-Santos (2010) understand that there is no need to leave completely ABC, but adopting pre-ABC in order to assess improvements in areas where LP was implemented.

According to Hutchinson & Liao (2009), Japanese companies have a strong management in costs. However, they give less emphasis on the accuracy of cost determination and more in its use, to direct the employee behavior towards certain objectives. In other words, it is more linked to strategy than the accuracy of the measurements.

Monden (1999) indicates two methods focused on continuous improvement, the target cost, which seeks

to support cost reduction in product development stage, and the *kaizen* cost, which aims to support cost reduction in the production stage. The target cost includes the profit management of the entire company throughout product development stage. This effort includes: (a) to design products desired by customers; (b) to determine the target cost, even investments, aiming at generating product profit at short and medium term, under market conditions; (c) to promote ways where product design reaches the cost targets, while satisfying customer needs for quality and prompt delivery. In this method, the direct margin is used, determined by the difference between revenue and variable and fixed costs identifiable to the product (Monden, 1999). Concerned to productive system, *kaizen* cost aims at reducing costs in manufacturing stages to help and to eliminate differences between target profit and estimated profits. In this regard, the system seeks to reduce actual costs to a lower level to cost goals; exert control to achieve cost reduction and continuously modify manufacturing conditions for reducing costs (Monden, 1999).

Identification of cost per value stream is a management approach where cost object is the value stream, in which costs are directly accounted in the result of each value stream at the time when are incurred, with no need to transit in stock as conventional methods, because reduced amount of stock is a result from lean system (Barros et al., 2012). In this case, the costs to be considered are the real and not the standard costs (also not used by SCM, which favors target costing). All costs that are not directly from value chains should be reflected in a separate line, being considered overhead expenses (Rosa, 2011). This procedure is also recommended for ABC method application.

The value stream mapping, besides identifying actions that do not add value and can be eliminated, allows the visualization of all process stages to a value chain, identifying information flows, material flows, waste sources, total *lead time* and the lead time for each process. LA, based on methods aimed at LP, expresses the reduction of total cost by eliminating unnecessary activities or activities that do not add value focusing only on processes that add value for the customer. According to Nakagawa (1991) is observed that this procedure is also be adopted by ABM.

Johnson (2005) points out that ABC is not presented as suitable for lean philosophy, for not providing a radical program to eliminate overhead expenses. For Johnson (2005), ABC does not change the old thinking which takes the accounting information as a key issue to control overhead expenses and to achieve better results. The main action to eliminate indirect costs and overhead expenses is in the design of operations and not in measurement by activities. From another perspective, ABM, when analyzing the

property of activities measured by ABC, circumvents this possible divergence of ABC with LP.

It is observed that, despite some convergences, there is no unanimity regarding the best practices for companies that practice LP. The context in which organization operates, its organizational culture and LP implementation level are variables that must be evaluated in choosing the best practices. Thus, it is important to understand the transition and/or evolution of management accounting versus SCM and LA (Chart 1).

It is perceived that there was a focus broadening from management accounting to LA, in almost all analyzed aspects. This does not necessarily point to a break, leaving everything that is consolidated, but denoting the inclusion of environment aspects where the organization operates and consequently to SCM.

2.5 Related studies

For Nakagawa (1991), from the second half of the 1970s, companies were able to compete based on quality and flexibility. Thus, discussion of the

relevance of new management technologies and measurement of costs, consolidated by SCM, were carried out. In this scenario of competitiveness and flexibility arises LP, which impacts on the cost structure of the organizations, affecting how costs and profitability are measured and controlled.

Maskell & Kennedy (2007) had to justify the need for introducing lean accounting in companies that adopt lean production. Maskell & Kennedy (2007) present various techniques to support three key aspects: visual management, value stream management and continuous improvement by setting value stream management as the appropriate technique to identify costs in this context. The lean accounting must be supported on the same principles of lean philosophy and therefore should minimize waste, being visual and enable people that work with this to be involved in *lean* change. In this context, LA appears to discuss accounting in lean organizations. The Chart 2 presents some empirical research on *accounting* and *lean* accounting practices, identifying author, year, objective and research findings.

Chart 1. Management accounting versus SCM and Lean Accounting.

Description	Management accounting	Strategic Cost Management (SCM)	Lean Accounting
Business environment	Export promotion; mass production; industrialization.	Globalization; flexible production; informatization.	Globalization; innovation; automation.
Business target	Profit	Survival; growth and development.	Survival; growth and development.
Business objectives	Profitability	Effectiveness.	Effectiveness.
Operations approach	Planning and control	Planning and control; innovation; financial planning and maintenance.	Attention focused on concrete abstractions; immediate visibility.
Organizational structure	Functional	Cross- functional.	Cell; multifunctionality of the operators; flow unit; minimized inventory.
Main area of accounting uses	Production and marketing	Research and development; planning and design; marketing; operations; maintenance and disposal.	Research and development; planning and design; marketing; operations; maintenance and disposal.
Cost Management	Cost pursuing; average unit; increase output to reduce average unit cost.	To pursue reduction of unit cost; to reduce activities costs that do not add value to customer.	To pursue reduction of total cost; to reduce consumption in order to reduce total cost.
Accounting Practices	Standard cost; business budget; direct cost; operational research; industrial engineering; others.	Practices of management accounting; more ABC and ABM; costing life cycle and quality; costing goal and of the value chain; analysis of environmental cost; analysis of logistics costs; analysis of <i>kaizen</i> cost and of the competitors.	Practices of strategic cost management, with an emphasis on <i>kaizen</i> cost; target costing; value chain costing; visual control systems; performance measurement; activity measurement.

Source: Adapted from de Johnson (2005), Shank & Govindarajan (1997) and Souza et al. (2010).

Chart 2. Studies related to Lean Accounting and Accounting Practices.

Author/Year/Publishing	Objective	Findings
Fullerton et al. (2013)	To identify the relation degree of LP implementation and the level of information related to lean principles.	50% of sample organizations adopt the principles of LP; 49% uses LA.
Slavov et al. (2013)	To investigate how principles of lean accounting are applied and which information is generated by this philosophy in the automotive industry.	Employment of target costing and <i>kaizen</i> cost, financial and non-financial indicators. Measurement of costs, waste and losses in production, information generating regarding inventory management.
Simpson & Greenfield (2012)	To identify changes in transition from a traditional system to lean accounting.	Control by value stream (adding value activities) is the adopted method concerning cost allocation.
Li et al. (2012)	To simulate distribution of industrial costs and result in three systems: management accounting, ABC and costing by value stream.	Costing value stream is the best alternative to establishing an operational and financial alignment in a lean environment.
Chiarini (2012)	Case study focusing on small and medium-sized companies with lean deployment.	Accounting by value stream had no advance; ABC is better despite investments and increased bureaucracy.
Barros et al. (2012)	Case study in company that was not in an advanced level of LP, as still needed to maintain significant levels of stocks.	Methodology and cost control by value stream simplifies costing; faster information to support managers in decisions.
Kennedy & Widener (2008)	To analyze paradigm change in traditional accounting derived from LP deployment.	Accounting practices mediate strategic initiatives of factory and design of management control system by value stream.

Source: Authors mentioned above.

Chart 2 analysis shows that the difference between LA and SCM is tenuous, tending toward convergence. It is observed (Kaspczak, 2008; Mcnair et al., 2006; Nakagawa, 1991) that techniques presented as LA are often discussed in the literature as SCM practices. Other studies reaffirm the similarity between LA and SCM practices. This can be seen particularly in studies of Kaspczak (2008), Mcnair et al. (2006), Nakagawa (1991), Santos (2010), Slavov & Faria (2011), Souza et al. (2010), and Souza (2011).

Thus, after the presentation of concepts and previous studies on research subject, it is exposed methodological procedures used in the conduct of the investigation.

3 Research method

Regarding nature and problem approach, the study was classified as an applied and qualitative research. It is also a descriptive research due to its objective to profile the characteristics of studied phenomenon, establishing relationships between variables (Dresch et al., 2015). As a research strategy, according to Yin (2010), it is a multiple case study.

By Yin (2010), it is a multiple case study because there are two research units (companies). These

operate in the segment of industrial goods, one in the metropolitan area of Porto Alegre and the other in *Serra Gaúcha*, both headquartered in *Rio Grande do Sul* and use LP in its operations.

Data collection was conducted from September to November 2013. For data collection, it was used a research script for the interviewed respondents. The interviews were face-to-face, from closed and open questions. The interviewer elucidated topics and questions, aiming at improved understanding and focus on the main research objective. Such research instrument was subjected to a pre-test with professionals from similar business when questions with double meanings were improved, some issues were excluded and others were included.

The documents of interest to the research were related to the production process, in tables, murals and visual devices able to present financial and none-financial information. In order to consolidate data collection process, *in loco* observation procedures were performed when authorized by interviewed.

Data were collected according to the model Reference Standard Matrix (Souza, 2011), allowing to identify the adherence level of practices and routines of companies concerned to principles and lean concepts, specifically Lean Thinking, Accounting,

Cost accounting and Value Stream compared to the evolution of the traditional accounting until the accounting level for *lean* company, understand as excellence stage, according to the parameters established in Chart 3.

A protocol for the case study according to guidelines and details presented by Yin (2010) was established for better evaluation and study direction. This protocol was analyzed together with other researchers of the subject.

The two participating companies are large-scale type. The first (Company A) is a publicly traded company, listed on Bovespa and classified as Level 1 of governance, active in the industrial goods segment and transport equipment. The second (Company B) is a private limited company, foreign multinational subsidiary, active in the industrial goods segment and cyclical consumer. The adherence of practices and company routines to principles and lean concepts, at least for 10 years, was the requirement for the choice of the two companies. Given the nature of the study and the need to access non-routine and not disclosed information to the market, accessibility was also considered.

Despite all the methodological precautions adopted for the research to ensure the achievement of planned objectives, limitations exist and must be recognized. This study summarizes the results of interviews, document analysis and *in loco* observations, under the access allowed by companies. This is considered appropriate for the development of research, but it seems correct to state that an in-depth case study and with wide access to data and information may add other findings in addition to what is reported in this research.

4 Research results

Interviews with controllership, finance, production and quality managers were conducted in the respective headquarters in the second half of 2013. The Company A in October and company B in November.

Before interviews, a visitation to the factory plants of both companies was performed. This provided an overview of the production system and a first observational contact about the use of lean manufacturing techniques. In Company A, presentation and further clarification of procedures were performed by the production manager and in Company B, by the quality manager. Next, the respondents of each company were interviewed.

After the conclusion of the interviews, with the questionnaires completed with responses and additional information, data were tabulated. Chart 4 shows the adherence level of lean management practices by the surveyed companies.

Regarding the deployment of these practices, in Company it has occurred with the assistance of external consultants. In Company B, it has been carried out by professionals of the own company.

In addition to the identification of adherence level of each construct, additional information identified in the case study will be shown next.

Regarding the foundations of **lean manufacturing (a)**, it was observed that the practices and the concepts related to lean thinking are in adaptation and improvement in Company A and in operation in Company B. According to presented considerations and evidence, including clear identification of the production processes, *layout*, stream mapping, visual control systems, continuous improvement

Chart 3. Adherence degree of accounting processes of Lean Accounting.

Level 1	Level 2	Level 3	Level 4	Level 5
Traditional accounting	Accounting for Lean company – Beginner phase	Accounting for Lean company – Adaptations and improvements phase	Accounting for Lean company – In Operation	Accounting for Lean company – Excellence Phase

Source: Souza (2011).

Chart 4. Adherence level to key constructs of lean system.

Key constructs	Company A level	Company B level
a) Lean manufacturing	Level 3 - Adaptations and improvements phase	Level 4 - In operation
b) Lean Accounting	Level 2 – Beginner phase	Level 2 - Beginner phase
c) Cost Accounting	Level 3 - Adaptations and improvements phase	Level 4 - In operation
d) Value Stream Mapping	Level 3 - Adaptations and improvements phase	Level 4 - In operation

Source: Research data.

programs and waste control, lean thinking concept is centered in manufacturing areas. The respondents linked to these areas - production and quality manager - showed greater clarity and understanding on the importance and applicability of the concept compared to controllership and financial managers. In both companies, lean manufacturing foundations have begun in the early 2000s.

The guidelines of Company A fit into the following competitive dimensions: cost, quality, service, innovation and improvement, flexibility, speed, and sustainability. The production system of this company includes tools of lean manufacturing and the Theory of Constraints (TOC), pointing a result of higher benefits for the use of combined tools. The company offers internal training on lean manufacturing, in addition, to act as multipliers of this knowledge, promoting also production forums focusing on continuous improvement.

The management thinking aligned to production strategy signals the continuous improvement obligation of 5S's processes, *kaizen*, and proactive approach. It works with improvement projects at factory and administration, encouraging the participation of all workers in the internal production system forum, providing professional and financial recognition to employees. As reported by the controllership manager, this proposed approach identified in 2012, 10,000 small improvements resulting in cost reduction of R\$ 3.5 million.

At Company B, employees involved in production processes receive training on lean manufacturing since 2000 and in 2013 began the process of identification of administrative sectors identification of administrative area for lean philosophy deployment. The Quality Control Circle (QCC) is intensively and promotes the continuous improvement of processes and products, being responsible for encouraging programs to ideas and improvement proposals. This program allows all employees engagement in improvement search, in addition to professional and financial recognition, a similar program of company A. This program, in 2012, financially measured the benefits of improvements in production processes. The company system management consists of subsystems: (a) continuous improvement; (b) EHS (environment, health, and safety); (c) quality of suppliers, processes and with customers.

Regarding **the lean accounting (b)**, it can be said that both interviewed did not know the term as presented. The two companies generate management information derived from the traditional costing by absorption method, maintain minimum stocks of raw materials, and deliver the finished product directly to the customer, working under the order. This is a relevant finding because it highlights a discrepancy or non-adherence of practices in relation to the theory

since literature recommends the need for alignment between LP practices and LA. In general, there is the statement that this alignment is necessary for objective achievement planned by management, as stated in the study of Maskell & Kennedy (2007) developed by US companies.

Company A daily monitors net income and cost of used raw material, which are their sources of relevant information for decision making. It was highlighted the projection of result demonstration of interview's day, which had already been given to the president of the company: "the projection of net income is the first information that the president verifies when in office," said controllership manager. Company B prioritizes the "return to its shareholder and financial availability" as financial manager information, which points out that "the result generated for shareholders is one of relevant information in the decision-making process." The budget control gets attention, both in administration and production areas. Non-financial indicators such as production volume, waste, rework, worked hours, hours of maintenance, among others, are also analyzed by management.

Non-financial controls are evidenced in control frames located in production cells. In the visit to the plants of the companies, it was possible to identify that the two companies provide quantitative information concerned to produced units and production time (*takt-time* and cycle time), preventive maintenance control and quality controls.

Company B is structuring new visual panels, where the information will be displayed in larger font and color use for better visualization of information. During the visit on this company, it was observed that the information provided in control tables are consulted by employees of production cells, CCQ and production managements. The Company A does not present information on the production process, only those related to people management.

It was found that the interviewed from production areas (production and quality manager) in both companies realize improvements that are not identified by those interviewed from the administrative area (controllership, financial and costs), which seem not being familiar with the routines and processes within manufacturing area.

More specific information on **accounting and cost accounting systems (c)** indicate that in both companies selling prices are calculated by cost area, along with commercial and management area.

Company A uses the costing by absorption method and standard cost system as generators of information for decision making. The man-hour rate is used for the distribution of hand labor cost and factory general expenses. For this company, the main indicator of product cost measurement is the proportion of raw material related to net revenue, given its representation

Chart 5. Practices and Uses of Strategic Cost Management.

Practice of SCM	Company A	Company B
ABC/ABM: Costing and Management based activities	2	1
Costing of attributes	1	1
<i>Benchmarking</i>	4	2
Competitive position monitoring	4	2
Estimated cost of competition	4	2
Competitors assessment based on published financial statements	4	1
Accounting per customers	1	1
Balanced Scorecard (BSC)	4	4
Lifecycle cost	2	3
Quality cost	4	4
Costing and strategic pricing	4	2
Target costing	2	2
Value chain costing	2	1
Intangible cost analysis	1	1
Environmental cost analysis	4	3
Logistic cost analysis	4	4
<i>Kaizen</i> cost analysis	4	4

in total cost. “Our control focus is the raw material which it is on average 70 to 80% of product cost” emphasizes the production manager. Company B, on the other hand, uses the costing by partial absorption method, and, for control purposes, during the period that company uses standard cost, adjusted by variations of costs in monthly closings.

Finally, there is **value stream mapping (d)**. Interviewed (controllership manager of Company A and production manager of Company B) presented their perceptions concerned to practices and concepts related to value stream mapping, which indicated no alignment between interpretations and statements. The interviewed from Company B showed the mapping of some value streams that are available in production cells but noted that it needs improvement and update. The respondent of Company A nothing said about it.

In response to the specific item of the survey instrument, respondents indicated the intensity degree of the use of each of the main cost management practices with strategic focus mentioned in the literature. The answers were marked according to the Likert scale of four points (1 for no use, 2 for partial use, 3 for use and 4 for heavy use), as shown in Chart 5.

Both companies strongly use quality costing, logistic cost analysis, *kaizen* cost analysis and Balanced Scorecard (BCS) as strategic cost management practices. The Company A shows greater use of other strategic cost management practices (benchmarking, competitive position monitoring, estimated cost of competition, evaluation of competitors based on published financial statements, costing and strategic pricing).

These identifications about practices used by companies, preponderantly, also reflect the objectives of lean accounting. Thus, in general, it cannot be possible to state that there is a qualitative difference between lean accounting and strategic cost management practices (SCM). It is observed, therefore, that surveyed companies, users of lean manufacturing and lean accounting, are also users of SCM practices. Some of these practices are clearly identifiable, such as *kaizen* cost and continuous improvement, quality cost and waste elimination, ABM, ABC and value chain cost with value stream, analysis of logistics cost and flow of materials, attributes costing and value stream. These research findings are also present in studies of Kaspczak (2008), Mcnair et al. (2006), Nakagawa (1991), Santos (2010), Slavov & Faria (2011), Souza et al. (2010) and Souza (2011).

Specific practices of lean accounting were cited by both respondents when in interviews. Value stream mapping was rarely mentioned by respondents from Company A and it is at mapping phase at Company B. The visual control is used with less intensity and presents non-financial indicators, particularly related to quality. The waste elimination is intensely controlled and measured by both companies, with a strong focus on quality costs.

5 Conclusion

This study aims at investigating the adoption of LA practices and its alignment with SCM. It was found that the surveyed companies have level 3 (adaptations and improvements phase) and level 4 (in operating) of use of LP management practices, however, they have level 2 (beginning phase) to lean accounting, indicating that they still require further

advances in the accounting system. It was found that LA is a concept under construction, whose practical applications are still incomplete.

Even with the lean philosophy deployment, surveyed companies continue to use traditional costing methods because they realize that current methods more sophisticated not lead to a significant increase in information accuracy. This is a result aligned to those found in literature, i.e., dissociation of LA practice in relation to LP. Despite this patent contradiction, controlling managers are satisfied with the information generated by financial and traditional cost accounting, and do not use the term LA as a practice resulting from LP. Managers of production, on the other hand, prefer the use of non-financial information to measure results generated by the production system.

Empirical research with LP in operation, among them Fullerton et al. (2013), Santos (2010) and Slavov et al. (2013) found that companies combine LA with practice and uses of SCM. Therefore, LP deployment is not a prerequisite for LA exclusive practice or even the resignation of SCM practices, but it is time to align the generation of controls and information with LP.

Thus, LA is not a necessary change, but a practice to be considered in SCM, in contrast to the view of most authors who research the subject. The necessary change understands that lean thinking is a business strategy and SCM should include practices for this strategy. Some practices are aligned to this strategy, as identified in this study, such as quality cost, logistics cost analysis, *kaizen* cost analysis, value chain analysis and Balanced Scorecard (BCS).

It is observed that these practices do not include visual management, emphasized by literature as a practice of lean accounting. It was found in research that use of visual management is also reduced to collect information as in production environment as in administrative activities. According to literature, this practice is relevant to companies that use lean thinking as a business strategy, due to providing an improved understanding of information at all levels: strategic, tactical and operational. This seems a possible improvement for the use of SCM practices combined with lean thinking.

Finally, it is possible to state that information generated by LA align with those of SCM in surveyed companies. Therefore, the adherence level of LA model concepts does not influence significantly and unfavorably the use of other SCM practices. Even though, it is important to note that in surveyed companies, the adherence to LA practices indicated by literature is low and therefore equal spacing of SCM practices.

Despite to answer the problem presented by research, and achievement of proposed objectives, research limitations unveil other opportunities for studies on

the subject. The main suggestion is to focus research on LA practices in a larger sample of companies that already have consolidated lean philosophy in the manufacturing sector and accounting system, which can provide further in deep studies on LA alignment with SCM. If this correspondence between LP and LA does not exist, it becomes relevant a research on what reasons lead to such situation. This practical reality may be relevant to newer topic discussion within its theoretical foundations. It is expected that in companies with these characteristics may be possible analysis and more robust comparative studies on the use of lean accounting practices in face of utilities defended by literature related to the topic.

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