

# Implementing a Lean Accounting System in a Lean Enterprise

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## Abstract

In the last thirty years, many companies across in many sectors have transformed their manufacturing system and have introduced a lean strategy. More recently, companies and practitioners are realizing that not only production processes but also cost management and accounting system need to be consistent with lean manufacturing strategy. In this perspective, Lean Accounting is proposed as an alternative approach to traditional management accounting systems in managing, evaluating, controlling and accounting processes of companies that implement lean strategies. The main purpose of Lean Accounting is to favor lean strategies and solve problems caused by traditional accounting systems. Lean Accounting offers an accounting support to lean operations and proposes the use of lean tools within the accounting area.

The aim of this paper is to explore existing literature on cost management and accounting practices within a lean manufacturing environment, with particular attentions on Lean Accounting, in order to describe characteristics, principles and tools of this innovative approach. The paper then outlines earliest results of a case study about designing and implementing a LA system in an Italian manufacturing enterprise. Weaknesses and problems associated with the introduction of Lean Accounting are discussed.

## Introduction

Toyota Motor Company is widely known for having created an important new management model in which the original just-in-time inventory management (JIT) has evolved into a lean production paradigm [1]. This model is characterized by reduction or elimination of waste, enhanced quality and productivity, continuous improvement, low inventories, short lead-times and maximized flow of materials, products, services, information and cash [2]. Lean manufacturing strategy is focused on processes and clients and its core is that “all business processes and functions integrate into a unified, coherent system whose single purpose is to continue to provide better value to customers” [3].

Since the early 1990's many companies in different industrial sectors have transformed their manufacturing systems and have adopted a lean strategy. The effects of this transformation have generated high interest among business owners and managers as well as professionals and researchers. Many authors have studied lean principles and practices and how enterprises may adopt them in order to successfully implement lean manufacturing strategies.

During the last 10-15 years a new topic has been raised in regards to lean enterprise. Companies and practitioners have been realizing that not only production processes but also cost management and accounting systems need to be consistent with lean strategy. Maskell

and Kennedy [4] argue: “For companies that have chosen the lean journey, it is important that their accounting, control, and measurement methods change substantially”.

In this perspective, some authors have extended lean thinking to accounting systems and financial reporting, proposing an alternative approach – namely Lean Accounting (hereafter LA) – specifically addressed to lean companies [5, 6, 7, 8, 9]. According to some authors, LA refers to a wide spectrum of changes in managing, evaluating, controlling and accounting processes of companies that implement lean strategies [10].

The purpose of this study is to explore the extant literature on cost management and accounting practices within a lean manufacturing environment. In particular, this study focuses on LA in order to describe characteristics, principles and tools of this innovative approach. The paper then outlines earliest results of a case study about designing and implementing a LA system in an Italian manufacturing enterprise. This company introduced a lean manufacturing strategy nearly two years ago and now it is recognizing the need for a consistent management accounting and control system. Company’s managers decided to study, in-depth, LA and verify if and how it may support their lean manufacturing strategy. Motivations and difficulties of implementation process are analyzed in the paper.

This paper is structured in three parts. In the first part, main literature on Lean Accounting is presented. Then the case study is presented and key results are discussed. Finally, the main conclusions and implications from case study are drawn.

### **Literature review**

Many authors highlight that traditional management accounting systems – based on standard costs, variance analyses, allocation of overheads – are not suitable for a lean environment [4, 10, 11, 12, 13, 14, 15, 16, 17]. Actually traditional accounting systems and methods were planned to support traditional mass production and they are not consistent with lean production [10, 17]. For instance, traditional accounting systems consider high inventory as value that increases company’s profits. On the contrary, lean manufacturing strategy adopts JIT inventory management and aims to reduce inventories that are considered as a waste [14]. Traditional mass-production measurements assume that profit is higher if companies fully exploit their production capacity. In lean enterprise profits increase if company optimizes the flow and creates value for customers [4]. Standard costing system is easy to maintain in a single-production enterprise producing high volume of uniform output, but it is inefficient and inconvenient in a multiproduct lean manufacturing environment [18]. Several authors [12, 4, 14] have highlighted other numerous critical issues of traditional mass-production measurements in a lean environment, such as: inconsistency of standard costs with continuous improvement principle; uselessness of calculation of product costs; negative effects and incorrect behaviors generated by variance analysis; complexity of accounting processes, that require many labor, specific competencies and complicated tools.

The main purpose of LA is to solve problems caused by traditional management accounting systems [17], to support lean transformation and to favor lean strategies [12]. In particular, the term LA refers both to accounting support to lean operations and to the use of lean tools within the accounting area [17].

LA is an innovative accounting approach and it is alternative to traditional management accounting systems. Main differences between the LA and traditional methods are summarized in Table 1.

Table 1 – Main differences between lean accounting and traditional accounting systems

|                        | <b>Traditional<br/>Management Accounting Systems</b>                            | <b>Lean Accounting</b>   |
|------------------------|---|--|
| <b>Main Features</b>   | Large and complex<br>Require huge amounts of non-value work<br>Take a long time | Lean<br>Fast<br>Timely   |
| <b>Object</b>          | Are focused on labor efficiency and overhead absorption                         | Financial performance and non-financial measures: quality, efficiency, timely, service, etc.       |
| <b>Purpose</b>         | Maximize use of firm’s resources<br>Match standard costs                        | Maximize “flow”<br>Promote continuous improvement<br>Provide value to internal/external customers. |
| <b>Focus</b>           | Products and costs  | Value Stream<br>Processes  |
| <b>Tools</b>           | Product costs<br>Standard costs<br>Variance analysis                            | Value Stream Costing/Value Stream Profit & Loss.<br>Visual Performance Measurement/ Box Score      |
| <b>People involved</b> | Controller<br>Management  | Accounting personnel<br>Value Stream Team<br>Management  |
| <b>Reports</b>         | Complex and often late<br>Use a language not always easy to understand          | Clear and easy to understand<br>Frequent: daily / weekly / monthly basis                           |

LA extends “lean” philosophy to accounting and performance measurement systems. This approach, in fact, adopts principles consistent with lean manufacturing. These principles are as follows [12]:

1. Elimination of waste from transactions, processes, reports, and accounting systems;
2. Continuous improvement at every level of the organization, included accounting area;
3. Focus on processes and customer value. While traditional companies focus on costs, the focus of a lean organization “will always be on what must be done to create more value for the customer” [4]. Controlling costs and earnings is very important in a lean organization but this is a way to improve customer value and not the main purpose of the accounting systems;

On the basis of these principles, the objectives of LA are as follows:

1. Measuring and monitoring performance in line with the logic of lean organization;
2. Simplifying accounting processes and management control systems, using lean principles and tools to ensure an effective control;
3. Encouraging the lean transformation throughout the organization and support lean culture through employees’ motivation and empowerment;
4. Improving decision-making and operational processes, by providing relevant, clear, timely and easy-to-understand information, at every level of the organization.

These objectives are pursued through the following tools:

1. Value Stream Costing/Value Stream Profit & Loss;
2. Visual Performance Measurement/ Box Score.

## **Value Stream Costing/Value Stream Profit & Loss**

In a LA approach, the main and unique cost object is the Value Stream (hereafter VS), that is a process through which company provides value to customers. A VS can be defined as “a group or family of related products or services that employ the same process steps” [18] or as “the sequence of processes through which a product is transformed and delivered to the customer” [19]. It encompasses all activities from customer order to delivery (purchases, production, selling, marketing, customer care, delivery, maintenance, etc.) and resources (labor, materials, machines, equipment, etc.) necessary to realize products and services for customers [20, 21]. Lean organizations are organized around VSs and, according to LA system, costs, revenues and profitability reporting should be organized around the VS [4]. Hence the name of VS Costing (hereafter VSC).

VSC aims to calculate VS total cost VS (and not the cost of single products) and understand how to maximize the value obtained in each stream. Costs allocation is made in accordance with the logic of direct costing. Costs to be charged to a VS can be grouped into 3 categories [22]: purchase costs of raw materials and other inputs used directly in that stream; processing costs or conversion costs, i.e. costs incurred to manage and operate the VS, such as staff costs, depreciation, other costs relating to plant and equipment, costs for support activities (e.g., technical, information system and quality control staff, etc.); facility costs or occupancy costs, that is costs related to the use of space. The latter (e.g., depreciation or rental costs, heating, electricity, security, building maintenance, insurance, etc.) are the only indirect costs that can regularly be split between the VSs using an allocation basis. Generally such costs are allocated on the basis of  $m^2$  occupied by each VS, considering not only production area, but also warehouses, offices for staff working directly to the VS, etc. As a consequence, reduction of spaces occupied by each VS is encouraged [20], as well as reduction of inventory and rethinking of production processes, consistent with the logic of lean manufacturing.

How indirect costs that cannot be directly allocated to VSs are accounted for? It depends. If their value is low, indirect costs are simply recorded in the general company's income statement. However, in according to lean production principles, these costs should be monitored and possibly reduced. If indirect costs are high, they can be allocated to VSs using a simplified version of activity-based costing. In this way, indirect costs are assigned to each VS based on the use of activities that have caused those costs [22].

It is worth noting that costs are recorded when they occur and not according to the accrual principle. This means that costs of raw materials are not charged to warehouse, but immediately charged to VSs. In this way, consistent with the logic of JIT, purchases made before materials are actually needed are discouraged [21]. Similarly, the production to stock is discouraged. Costs (direct labor, equipment depreciation, etc.) of unsold products are in fact charged to VSs in the period in which they were incurred. VS costs are calculated each week to allow stream's responsible to know in real time data required for the control and management of the process. VS's costs are included in the Value Stream Profit & Loss (hereafter VSP&L). It shows VS profit, resulting from the difference between revenues from sales and costs charged to the VS. Table 2 shows an example of VSP&L.

In summary, VSC provides data that are: objective and easy to calculate, as VSC is “a simple summary using direct costing of the VS” and costs allocation is really reduced [4]; easy to understand by all those working in VSs and not only by accounting personnel [12]; timely, since VSP&L should be prepared weekly [19]; consistent with the lean manufacturing approach, as, for example, profitability of a VS increases if behaviors consistent with lean principles (eg., reduction of inventory) are adopted; moreover “it does encourage optimization of the flow for the entire VS” [21].

Table 2 – An example of VSP&L (adapted from IMA [19])

| Item                            | Week 1           | Week 2           | Goal             |
|---------------------------------|------------------|------------------|------------------|
| <b>Sales</b>                    | <b>2.708.333</b> | <b>2.998.500</b> | <b>3.200.000</b> |
| Material costs                  | 1.040.000        | 1.229.000        | 1.300.000        |
| Employee costs                  | 190.667          | 192.000          | 195.000          |
| Equipment-related costs         | 156.000          | 156.000          | 155.000          |
| Occupancy costs                 | 120.022          | 120.022          | 120.000          |
| Other value stream costs        | 296.942          | 298.451          | 275.000          |
| <b>Total value stream costs</b> | <b>1.803.631</b> | <b>1.995.473</b> | <b>2.045.000</b> |
| <b>Value stream profit</b>      | <b>904.702</b>   | <b>1.003.027</b> | <b>1.155.000</b> |
| <b>% on Sales</b>               | <b>33,40%</b>    | <b>33,45%</b>    | <b>36,09%</b>    |

Due to its innovative nature, VSC cannot be introduced suddenly and without adequate preparation. On the contrary, it is necessary that some conditions are met and that companies are adequately prepared. This means, first of all, that VSC introduction should be preceded by the progressive introduction of lean production, used to reorganize production processes and identify VSs at the production level. When this stage is completed and the company has fully assimilated lean principles, it is possible to rethink the management control system and introduce the VSC.

### Visual Performance Measurement/ Box Score

“Visual management is used in lean organizations in order to relay information as soon as it is needed in a simple, easy-to-understand fashion” [4]. LA eliminates long and complex reports, resulting from a top-down process. Performance measurement is done frequently and quickly. It focuses on few key indicators, expressed in plain language and easy to understand by all personnel involved in the VSs. Moreover in LA traditional financial information are integrated by non-financial information, for example, relating to products quality and production efficiency. Each indicator, to be truly useful and meaningful, must be linked to company’s strategic objectives [20] and its key success factors [9]. In other words, indicators should be developed according to a top-down approach as they should be defined in the following sequence: first at the corporate level, then at the division level, then at the VS level and finally daily cell metrics should be defined [23].

According to the logic of visual performance management, performances should be daily measured by VS members and hand-written on special boards located in places where value is created, primarily in production departments [20].

Every week these measurements come together in a Box Score (hereafter BS), a summary report in which operational indicators are integrated with other information relating to VS performance. BS is complementary to VSP&L and it consists of a simple board showing three types of indicators: operational section, capacity section and financial section [4, 9, 20, 24]. The operational section contains an average of 3-6 operational performance indicators, such as: on-time delivery, first time through, throughput time, average cost, etc. The capacity section contains three indicators measuring (in percentage): capacity consumed by productive activities, capacity consumed by supporting activities (e.g., downtime caused by setting up and maintenance); unused and so available capacity. These indicators show how production capacity is used and potential bottlenecks in the operations flow. Unlike the other two sections, capacity indicators need not be calculated weekly, but only when changes in production processes are introduced. The financial section contains main financial indicators,

calculated according VSP&L: revenues, VS costs, VS profit, VS ROS, etc. Each indicator is compared with the value of the previous week and with the annual objective. Table 3 shows an example of BS.

Each BS is analyzed in specific weekly meetings involving managers, VS directors and some representatives of employees working in that VS, so that they can discuss operational, financial and capacity issues and find a solution to problems encountered in the VS. So BS allow a direct and understandable vision of the current situation in each VS, with respect to its objectives. They also allow identifying areas for improvement and increase staff motivation [4, 12, 20, 23].

Table 3 – An example of Box Score (adapted from IMA [19])

| <b>Item</b>                             | <b>Last Week</b> | <b>This Week</b> | <b>Future State</b> |
|---|------------------|------------------|---------------------|
| <b><i>Operational</i></b>               |                  |                  |                     |
| Units per person                        | 466              | 516              | 550                 |
| On-time shipment                        | 92%              | 94%              | 98%                 |
| Dock-to-dock days                       | 15               | 15               | 14                  |
| First time through                      | 85%              | 85%              | 90%                 |
| Average product cost                    | 112.75           | 111.50           | 110.00              |
| Accounts Receivable<br>Days Outstanding | 42               | 43               | 42                  |
| <b><i>Capacity</i></b>                  |                  |                  |                     |
| Productive                              | 42               | 42               | 45                  |
| Nonproductive                           | 38               | 38               | 30                  |
| Available                               | 20               | 20               | 25                  |
| <b><i>Financial</i></b>                 |                  |                  |                     |
| Sales                                   | 2.708.333        | 2.998.500        | 3.200.000           |
| Material costs                          | 1.040.000        | 1.229.000        | 1.300.000           |
| Value stream profit                     | 904.702          | 1.003.027        | 1.155.000           |
| Return on Sales                         | 36%              | 39.85%           | 42.55%              |

### **Case study and main results**

Empirical research is based on a case study and the participant observation method was adopted [25, 26]. In participant observation, researchers are directly involved in the field; they have personal contacts with both the people and the setting, and may personally experiencing the situation in a real-world fieldwork [26]. In particular, the authors were full participants in the design and implementation of the project, with a collaborative approach (not as simple spectators), and multiple observations were realized continuing over time (the project started in October 2013 and is still ongoing).

The case was selected with a purposive sampling strategy [27], aimed to identify a company that is currently experiencing a path towards lean accounting. The case study involves a medium-sized company (about 230 employees and more than € 60 million turnover), operating in the engineering industry. It is located in Marche region (Central Italy), but it exports its products in all five continents. The company has preferred to remain anonymous, so it's not possible to provide further information about its products, as it would allow easy identification of the company.

The company adopted a lean manufacturing strategy nearly two years ago and now it is recognizing the need for a consistent management accounting and control system. The

company's management decided to study, in-depth, LA and verify if and how it may support their lean manufacturing strategy. In this sense, this case represents an ideal opportunity for authors to collect information about the planning and implementation process of LA.

Adoption of lean principles has already led to some early changes in the company: identification of five value streams, reduction of inventory, process and layout redesign, improvement of production flows, quality improvement, identification of some operational indicators to monitor production process efficiency and product quality (e.g. throughput time, number of non conforming products, quantity of scrap), organization of weekly meetings with VS workers to discuss and resolve production process key issues.

In the last years the size of the company has been rapidly growing. This growth is partly the result of a merger operation with another engineering company, and partly the consequence of recent huge investments (in R&D, new plant and equipment, product innovation) that have allowed and will allow the company to attack new markets and gain growing market share.

As part of this complex process of change, the company has begun to consider the opportunity to implement a new management control system, that is consistent with its organizational characteristics and with external competitive conditions. To date, in fact, the company has neither a controller nor a real management control system. It makes use of many different tools that monitor business performance, without any coordination and using the logic of traditional control systems. The responsibility of management control is in the hands of the general manager (who is also the CEO of the company). He is supported by an accounting officer, who produces and processes accounting data, and by some outside consultants. To design the new management control system, a work group was created. Two "historical" business consultants – who have supported the company in its recent strategic and production process transformation – and two academics (authors of this paper) belong to this group. This solution has enabled the creation of a mix of different skills: operational, financial, academic, etc. The work group, which is still working, meets monthly and periodically discuss with the board chairman and with the general manager-CEO of the company. The aim of the work group is to create a management control system consistent with lean production principles and able to properly measure costs and economic results in each VS.

The project has been divided into six steps: 1) recognition of the main and most innovative theoretical management control systems; 2) identification of the system more consistent with company's strategic, organizational and operational characteristics; 3) mapping of systems and methods the company currently uses for management control; 4) early designing of a new control system and possible replacement / integration of existing systems and tools; 5) development of the new management control system; 6) implementation.

The study of management control systems recently proposed by literature, together with the analysis of company's characteristics and information needs, led to identify LA as the most suitable approach to set the new management control system. In fact the company has already acquired lean enterprise principles and has already introduced these principles in the organization of the production process. Now is therefore ready to adapt its cost accounting system and to adopt VSC. At present, therefore, the main problem is how to introduce and manage change. For this purpose, a mapping of all the accounting tools currently used by the company has been prepared. The working group is now thinking to create a unique control system, so that it is integrated, coherent and streamlined, with no overlap or redundancy of information. At the same time, starting from available accounting data, the work group has started a simulation of VSC, it is improving existing VSs and is developing a scheme of VSP&L. The next step will be the creation of a BS. The starting

point will be the company's strategy. It will allow identifying company's competitive advantage and key success factors and then identifying key performance indicators to be monitored.

### **Conclusions and Implications**

The design of the new system of management control is proceeding in respect of two key words: "gradualism" and "personalization". The work group think that it is necessary to proceed with caution and with "small steps", to be able to progressively identify accurate and timely performance indicators. This means adopting a continuous learning perspective that will allow the work group to define a management control system actually accurate, streamlined and timely.

The principle of personalization is consistent with the idea that the "one best way" no longer exists. This means that in designing the new management control system it's important to share LA basic principles, but it is equally important that these principles are applied respecting company's peculiarities and needs. It is impossible to implement a standard LA system in every company. On the contrary each company need to design its own LA system, customizing tools, procedures and implementation process.

But a good design of the system is not sufficient to ensure adequate implementation and proper use of LA. The organizational aspect should not be underestimated and it is from this point of view that arise some concerns about the project.

As already mentioned, the design of the new management control system has been assigned to a working group composed of external consultants. The main reason is that in the company currently doesn't exist a controller. So the problem is: The work carried out by work group has been approved by top management, but who will manage the new control system when the project will be completed and the system will be implemented? To date it is still unclear who will be the future controller and this is a very critical issue. There are several possible hypotheses and they all have some weaknesses.

The accounting officer, who currently supports the general manager/CEO, could be the future controller. The advantage of this solution is to appreciate the professionalism of the officer and his knowledge of the company. However it would be necessary to involve him as soon as possible in the work group and in the planning and implementation process of the control system. In this way the effectiveness of the next phase of implementation of the control system would be increased and the new controller could gradually acquire knowledge needed to manage the new system.

Company's top management, on the contrary, could decide to recruit a controller from outside. But, in this case, will the new controller approve the new control system? In this latter case, in fact, the risk is that the work carried out so far is criticized and disapproved, with the result that the company would lose valuable time searching for a new model to be adopted.

A growing and rapidly changing company needs to have as soon as possible tools that can effectively measure its performances and its ability to achieve its objectives. But it is necessary to have people who can use these tools. Perhaps the company would have done better to immediately identify a controller and assign him the project responsibility. It is questionable, in fact, that a LA system is completely outside designed and managed. Such a change, in fact, requires a clear sponsorship by company's top management, but also a strong involvement of company's staff and, above all, of its controller.

It's important to remember, in fact, that according to LA principles, the controller is no longer the one who holds and produces information for management control, but he's an important manager whose role is essential for the success of LA. His role is to help the entire



organization to adopt and acquire LA principles, providing VS teams information and tools to let them prepare their own performance reports. The controller must offer his expert advice to company's VSs [17]. If this figure is missing or does not have adequate involvement in the project, the risk is that everything remains only "on paper".

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