

Conceptualization, nomenclatures and costing methods: a review of the accounting literature applied to production engineering

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Abstract

This article raises essential elements about the principles and systems of costing described in Brazilian accounting literature, with the aim of presenting an interdisciplinary approach to conceptualizations, nomenclatures and costing methods present in the business context. Its approach reveals a growing integration with productive areas, notably Production Engineering. The methodological procedure employed was essentially based on bibliographic surveys using a systematic literature review, with a qualitative approach, prioritizing works by classic authors in the field of Management Accounting and Cost Accounting. Subsequently, contemporary approaches were analyzed and discussed, including definitions and contexts associated with Lean

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Manufacturing and Lean Accounting. The results obtained indicate the need for complementarity and more effective interaction between the areas of knowledge. In the current post-pandemic economic situation, there is a demand for more holistic and integrated visions, moving away from fragmented and in practice departmentalized approaches. The convergence of these areas of knowledge is vital for the efficient planning, control and execution of successful industrial processes, especially in an increasingly globalized and competitive business scenario.

Keywords: Accounting; Production Engineering; Conceptualization; Nomenclature; Costing Methods.

1. Introduction

The integration between the areas of Accounting and Production Engineering has been intensifying more and more rapidly in different organizational contexts. Although there are various interpretations of concepts, nomenclatures and costing methods, there is a lack of studies that align these themes in an interdisciplinary way, especially with a focus on production activities in different segments, which require more standardized procedures.

Despite attempts to incorporate similar premises, standardization during practical applications often follows different, subjective logics, or is even guided by purely disciplinary perspectives, since the application of the methods remains highly specific to each organization. As a result, various costing methods have been developed in the literature and practiced by companies, and the choice of the most appropriate method must take into account the type of organization and the information sought (BORNIA, 2010; ABBAS *et. al.*, 2012; MEDEIROS *et. al.*, 2017; FARIA *et. al.*, 2018).

When considering the theoretical and practical contributions made by the Applied Social Sciences, especially Accounting, there is a considerable combination of accounting procedures and normative instructions, established by national and international regulatory bodies, including those with the force of law, which at different times, dissipate in production environments. This fact, for convenience, has been associated with the perception that Accounting is predominantly linked to tax and corporate aspects, while Production Engineering focuses more on product and process management (SOUZA & DIEHL, 2009).

In this context, divergences in the application of concepts, nomenclatures and costing systems or methods become evident, making structured and standardized applications difficult, especially among small and medium-sized companies (BORNIA, 2010; ABBAS *et. al.*, 2012; MEDEIROS *et. al.*, 2017). This problem is aggravated by the popular perception that the role of the accountant is limited to compliance with legal obligations, such as calculating taxes, rather than being recognized as an advisory professional who guides and promotes transparency in management processes (SILVA, 2016).

Considering these assumptions and the scarcity of theoretical discussions on these interactions in Brazilian literature, this study is justified by the need to (re)establish in a clear and appropriate way the association of concepts, nomenclatures and costing methods from a perspective that is not solely accounting. As such, this research aims to fill a gap by highlighting the existing theories and practices in accounting that complement the productive areas and segments, given the existence of common actions and objects of study.

2. Literature Review

This section presents a review of the Brazilian literature, based mainly on renowned books on Cost Accounting, addressing, among other points, concepts and theories. The following are presented as sub-items: The relevance of interdisciplinarity for business development; Organizational management and concern with business costs; And Accounting as a management tool for organizations.

2.1. The relevance of interdisciplinarity for business development

Business development, because of its breadth of theoretical debates, practical, global, sustainability issues, technological innovations and market changes, crosses several areas of knowledge, needing to be understood interdisciplinary. What can be defined as a crossing point between disciplinary activities with different logics (LEIS, 2001).

It is the search for a balance between fragmented analyzes and simplifying syntheses (JANTSCH & BIANCHETTI, 2002). The attempt to equate views marked by rational, instrumental, and subjective logic (LENOIR & HASNI, 2004). It is even related to teamwork, but also individual work (KLEIN, 1990). Where, in a deep sense, interdisciplinarity is always an alternative reaction to the standardized disciplinary approach (whether in teaching or research) of the various objects of study, there always being, and therefore, several possible interdisciplinary reactions to the same challenge of knowledge (LEIS, 2001).

If, on the one hand, the many disciplinary studies of science not only brought the advantages of the division of labor but also the inconveniences of overspecialization, confinement and the shattering of knowledge, not only did they produce knowledge and elucidation, but in certain cases, ignorance itself and blindness (MORIN, 2004). When the subject is knowledge, a priori, no focus can be excluded, where what matters is its advancement through its different manifestations (LEIS, 2001).

When analyzing cost management in projects, for example, it is known that the theme involves several areas of knowledge, especially those that are part of the triangle of primary objectives: scope, deadline, and cost (CARVALHO & RABECHINI, 2011). Although the literature presents several forms of costing, applicable to different organizations, the processes used to estimate costs, their criteria, their methods and techniques, vary between areas and are equally related to their dimensions and complexity (BARBOSA *et. al.*, 2014).

For Barbosa *et. al.* (2014), obtaining budgets is usually carried out based on experiences gained in previous projects. However, companies that are more mature in cost management have specific methodologies to measure such values. In the basis for structuring the costs, an important reference is the control of financial expenditures, which allow evaluating and also analyzing the planned restrictions for each step, without harming the quality, term, scope and risk of the other activities involved in the project (SANTOS, 2015).

Although there is a consensus that direct costs are more easily identified and quantified because of their direct relationship with the resources needed to carry out the activities (FARIA *et. al.*, 2020). Indirect costs are more difficult to control because they are the organization's overall costs incurred for the benefit of over one activity, however, even if they are not directly related costs, they can be added to the total budget (CARVALHO & RABECHINI, 2011; BARBOSA *et. al.*, 2014).

Carvalho & Rabechini (2011) also add that working with analogies leads to inaccuracies even if there are similar historical data. However, Faria *et. al.*, (2020) describes that the availability of historical data from previous activities and projects is an important tool for the identification and development of estimation models, since it provides parameters already performed by the company, which can be used for a more reliable evaluation of the estimated data.

2.2. Organizational management and concern with business costs

The lack of control in cost management and efficient procedures for measuring expenditure and, results is one problem faced by a large portion of Brazilian companies, especially micro, small and medium-sized ones, making it difficult to identify at the end of a period, what was their profit or loss, resulting in the possibility of suffering more significant losses when keeping excess goods in stock (CREPALDI, 2006).

A costing system adjusted to the company's reality can be characterized as an appropriate place to record data related to input of raw materials, direct labor and indirect

Coeslak, M.; Cieslak, A.M.; Menon, G.; Jung, M.A.; Antunes, A.C.; Gonzaga, C.A.M. manufacturing costs, processing this data and generating information that can be intended for internal and external users of the organization (GUERREIRO, 2011).

Cost Accounting is a branch of Management Accounting, arising from the emergence of industrial companies, in order to determine the costs of manufactured products. As in the past, products were normally produced by artisans who were not legal entities, of which they only used Accounting basically to calculate the result for the period (BORNIA, 2010).

With the constitution of industries, cost systems naturally followed the evolution of the global economy, where on the one hand investments in the level of product quality, improvement in logistics and distribution, combined with service and marketing strategies, and are noticeable. It is undeniable that the ultimate price of the good or service is essential for the organization's survival. As well as the knowledge of factors such as contribution margins for each product, economic and financial equilibrium point, rates of return and profitability, purchase and stock planning, are essential to establish a price policy that is competitive, secure at the same time and profitable (CREPALDI, 2006).

Beuren (1998) exemplifies the type of integration that must exist between Cost Accounting and the role of organizational management, if in this case the company is focused on leading the best consumer prices, its greater emphasis must be centered on cost control, in order to achieve an expansion of sales at lower prices than those of its competitors.

The expression strategic cost management has been used in recent times to designate the integration that must exist between the cost management process and the company's management process. This integration is understood as necessary for companies to survive in an increasingly globalized and competitive business environment (MARTINS, 2010).

2.3. Accounting as a management tool for organizations

Industries today seek to reduce and eliminate waste through projects and actions for continuous improvement, in order to enable increased productivity within the production process, preserving quality and serving the customer on time (GRACANIN *et. al.*, 2014; MEDEIROS *et. al.*, (2017) These operational improvements aim to maximize efficiency and effectiveness in the entire production system, reducing non-value-added activities, unwanted costs, and eventually increasing net profit (LÓPEZ *et. al.*, 2010).

When starting an approach to the key concepts necessary for structuring a costing system, it should be considered that, for these analyses, the starting point is in the collection of data in the productive field, associated with an efficient control and calculation method.

Because managers need to rely on the support of tools that guarantee them greater agility and efficiency in decision-making processes, whether they are more flexible to ensure results, or even more aggressive in order to make their products more attractive, expanding their market share (CORONADO, 2006).

Considering that the activities developed by companies aim to achieve certain effects, they must be synchronized with their larger goals and must not be performed uncertainly. It is necessary that they be elaborated and controlled, since the management process supports the decision-making process, which must be carried out through some steps such as strategic planning, operational planning, programming, execution and control (CAGGIANO & FIGUEIREDO, 1997).

In the new form of global competition, companies are required to be committed to the continuous and complete improvement of their products, processes, employees and also to maintain a proactive attitude towards the constant economic, social, cultural and environmental changes that permeate the universe in which they are inserted (SOUZA & CLEMENTE, 2001).

When making these findings, over time, not only entrepreneurs were interested in the information generated from the results of their ventures. The society is increasingly interested in these economic movements, such as unions, governments, tax authorities, investors, creditors. Given this, the Accounting departments were considered as an important social instrument, as the diversity of users and entities wanted to know more about business development (CREPALDI, 2006).

When mentioning key contributions from Brazilian authors: Marion (2009, p. 203), states that “Accounting is the instrument that provides the maximum amount of useful information for decision making inside and outside the company, since it is ancient and it has always existed to help people decide.” Iudicibus (1994, p.26) states that “Accounting assumes its major role, to support the manager in his decisions, giving greater security to his judgments”.

Although “Accounting is a science that aims to guide, provide information, control and record facts that occur in the assets of companies and/or entities” (BARRETO, 2003, p.19). It is increasingly assuming a relevant role inside and outside organizations, with no possibility of a formalized activity, functioning and fulfilling its mission without an information system that can provide accurate values at all times, considering the dynamics of business and communications.

Regarding Management Accounting, Padoveze (2000, p.30) also states that “one of its functions is to create value for shareholders, as it can be measured economically”. In this way, it can be understood and used as a management tool, helping in the economic life of companies, as well as aiming to advise entrepreneurs in their managerial and strategic functions.

Therefore, Management Accounting is a process through which the aim is to identify, measure, tolerate and evaluate information on the economic situations of organizations, in order to provide its various users with knowledge about their assets, and allowing economic reports to be provided financial and social. “Characterized, superficially, as a special focus given to the various accounting techniques and procedures, known and dealt with in Financial Accounting, costs, in the financial analysis of balance sheets, etc.” (IUDÍCIBUS, 1998, p.21).

In other words, Accounting is an accounting system composed of norms, rules and principles for the accumulation, generation and analysis of data that should meet a company’s internal and external needs (SANTOS, 2017). Enabling administrators to gain an advanced view, which, together with information systems, offers important contributions in the construction of current strategic planning and in subsequent moments (SÁ, 2006).

Finally, it is worth highlighting the existence of the Brazilian Accounting Standards (NBC), which make up a set of rules and procedures of conduct that must be observed as requirements for the exercise of the accounting profession, as well as the doctrinal concepts, principles, structure technique and procedures to be applied in carrying out the work provided for in the standards approved by resolution issued by the Federal Accounting Council (CFC).

3. Material and Methods

The methodological procedures adopted by the authors of this study, who have diverse academic backgrounds and professional experiences, were meticulously carried out through a review of renowned authors, both classic and contemporary in the accounting world, who explore and discuss the concepts, nomenclature of terms and costing methods, also extending to Production Engineering.

The method used in this study was the Systematic Literature Review (SLR). Understood as a common core of various methods developed by different authors, it encompasses research stages such as: i) the careful selection of sources; ii) the selection of studies; iii) the assessment of the quality of the selected studies; and iv) the presentation of the

Coeslak, M.; Cieslak, A.M.; Menon, G.; Jung, M.A.; Antunes, A.C.; Gonzaga, C.A.M. results obtained in an orderly manner (BRIZOLA & FANTIN, 2016; MORANDI & CAMARGO, 2015).

It is important to emphasize that the bibliographical research was conducted using books and scientific articles. However, practically all other types of studies require work of this nature, especially research carried out using only bibliographic sources (GIL, 2009).

According to Cervo & Bervian (1983), bibliographical research aims to explain a problem using theoretical references published in documents, either independently or as part of descriptive or experimental research. In both cases, the aim is to learn about and analyze the cultural and scientific contributions of a subject, theme or problem in the past.

Analyzing the data is an important phase of the research, integrating the presentation of the results with considerations about the study, and can be final or partial, providing space for subsequent research (MARCONI & LAKATOS, 2017). Given the focus of the research on the methods in question, they were part of a broader process. Qualitative analysis was adopted because of its ability to prioritize the evaluation of micro-processes, allowing for intensive considerations in terms of the breadth and depth of the data obtained (MARTINS, 2004).

Therefore, this research is characterized as an SLR with qualitative analyses, since its data was predominantly obtained by means of a thorough review of renowned works, whose contents are recognized nationally and even internationally, establishing the principles of Accounting as a science. A distinctive feature is the search for purer and more original definitions by their creators, which continue to underpin theories to this day.

4. Results

Next, the analysis and discussion of the results are presented in the following topics: the organization of costs in the industry and its nomenclature; Costing methods stated in the literature and their applications; Strategic cost management as an instrument for decision making; Variable analysis: Costs x Volumes x Profits; and Costing Systems in the Lean Manufacturing and Lean Accounting context.

4.1. The organization of costs in the industry and its nomenclature

In order to understand the costing processes, it is necessary to define the terms for a correct interpretation, given the multiplicity of understanding and their misuse. For many generically, everything is “cost”, while for others it is “expense”. Thus, interpretations do not

facilitate the understanding and evaluation of what is spent to produce, manage and sell, which are different activities, hindering analysis, corrections and decision-making (BERNARDI, 1998).

Expenditure incurred in production is allocated to the final product. For that, “the costs are spent, directed to the production of goods; therefore, inherent to the activity of producing, including the production itself and the administration of production”. (BERNARDI, 1998, p.40). In this context, “the nomenclature referring to product cost aggregation levels is important for monitoring the production process and for comparing products regarding resource consumption” (SOUZA & CLEMENTE, 2011, p.45).

Expenses correspond to the financial commitments assumed through acquisitions necessary to get its products and services. Disbursement can be understood as payment for something purchased. Thus, expenditures are usually confused with disbursements, however, they are original concepts. While expenses represent the acquisition of purchased goods or services, disbursement is considered as payment for these goods or services. Therefore, “production costs are all those spent on transforming raw material into finished product, for example, direct costs (direct materials and direct labor) and indirect costs (production support) (ATKINSON *et al.*, 1997).

According to Souza & Clemente (2011), one of the first costs to be observed is the Primary Cost (PC), represented by the raw material and direct labor consumed in the manufacture of a product. This classification is useful because it represents the weight of the material. Raw material and the labor effectively used in the transformation process. In this way, the primary cost is sometimes used as an apportionment criterion (split) for the indirect manufacturing costs in the structuring of the Cost Centers (CC).

The Transformation Cost (TC) represents the company’s efforts, measured in monetary values, to transform the raw material into a finished product. Comprising Direct Labor Costs (MOD) and Indirect Manufacturing Costs (CIF’s), measuring the value in the production process, which can also be used as an apportionment criterion for appropriating the CIF’s to each type of product. For as a definition, the cost of production, in a certain period, is the value of all goods and services consumed for the transformation of raw material into finished product, used to inform the manufacturing margin, the profit before payments of administrative, financial expenses and charges, allowing the assessment of the potential of the production process to generate profit (SOUZA & CLEMENTE, 2011).

Direct Labor Costs (MOD) are those directly related to workers in product manufacturing activities. They represent the wages of workers directly involved in

production. Employees who do not work directly with the manufacturing make up the indirect workforce. Indirect Manufacturing Costs (CIF) are all other production costs (consumables, indirect labor, depreciation, electricity, telephone, water) (BORNIA, 2010).

The Cost of Manufactured Products (CPF) refers to the cost of production of the goods actually finished in a period, incorporating the variation in the inventory of products in process. The Cost of Products Sold (CPV) refers to the sale carried out in a certain period, and this value is compared with the operating revenue to calculate the operating gross profit. Finally, the Cost of Goods Sold (CMV), also known as marketing, represents, in a period, the monetary expression of the efforts made by the company to create, meet and maintain the demand for its products, such as salaries and commissions to sellers, advertising, sales promotion, among others.

For Bornia (2010) the expenses are the values of the inputs consumed for the company's operation and not identified with the manufacturing process. They refer to activities outside manufacturing being separated into administrative, commercial and financial. Therefore, expenses are differentiated from manufacturing costs because they are related to the general administration of the company and the marketing of the product, among these there are variable and fixed expenses.

Variable Expenses (DV) are amounts spent only when sales are made. Sales tax and salesperson commission are normally considered as variable expenses. However, for each company, it is necessary to evaluate, among the amounts spent, those that are paid or that occur directly because of the value sold, and therefore must be included in the Sale Prices of Goods (CMV).

Fixed expenses (DF) are all expenses that occur whether sales occur in the company. These are the amounts spent on its functioning, the structure set up to buy, stock and sell. These expenses must also be included in the sale price of each item, including considering the value that the sale of each item can contribute to cover these expenses.

Regarding expenses, it can be understood as the financial expenditure (output) with which the entity pays for any acquisition of a product or performance of a service, a sacrifice represented by delivery or delivery promise (payment). The expense is the value of the inputs purchased by the company, whether they were used. It is not synonymous with disbursement, which is the act of payment, which may occur at a different time from the expense. For example, if a material purchase is made within 60 days of payment, the expense will occur immediately, but disbursement will only occur two months later (BORNIA, 2010).

According to Borna (2010), investment is the value of inputs purchased by the company that are not used in the period, which may be used in future periods. As necessary efforts, productive, administrative and sales activities that will benefit long periods (fixed assets), which, through depreciation or amortization, will become costs or expenses, depending on their origin or nature (BERNARDI, 1998). In a more simplified way, the investments represent the expenses activated according to their useful life, where these investments will bring present and future benefits. In Figure 01, summarizing the connection of the main terms used in Accounting.

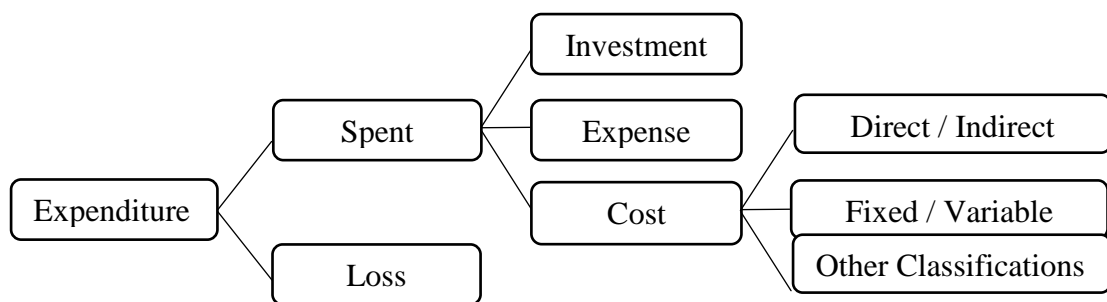


Figure 1: Demonstrations of the origins of the most used terms in Accounting

Source: Silva & Garbrecht (2016, p. 77), with changes made by the authors (2021).

The term Loss is usually seen in accounting literature as the value of inputs consumed abnormally, as losses are separated from costs and are not incorporated into inventories. Abnormal losses are goods or services consumed in an unscheduled, unexpected or involuntary manner, such as those that occur in floods, fires, landslides, accidents. For example, if for any reason there is an abnormal consumption of raw material, this must be characterized as a loss.

For the Production Engineering literature, these terms often mean the increase in work, because by increasing expenses and not adding value to the product, which also from the entrepreneur's point of view, they represent inefficient expenses. There are also losses that are related to the company's productive activity, which are normal losses, as they are usually predictable and estimated during the production process, whether in the initial dimensions of the raw material or resulting from cutting machines, chemical reactions, evaporation, heat or energy dissipation, among others.

4.2. Costing methods stated in the literature and their applications

Direct or Variable costing comprises the method of appropriating costs called Variable Costing, which distributes only the variable costs of production to the quantity of products produced in the period. Since the fixed costs of production are not part of the cost of the product, being treated as expenses for the period in the same way as administrative, commercial and financial expenses (GUERREIRO, 2011).

Crepaldi (2006, p. 232) states that “the expression variable expenses designates the costs that, in absolute value, are proportional to the production volume, they oscillate in direct ratio to the increases or reductions in the quantities produced”. Therefore, the greater the consumption of direct materials in the manufacturing process, the greater will be their contribution to the increase in variable costs.

This variable costing method is specifically aimed at managerial use, as it violates formal accounting principles. Having as variable cost classifications, the values of the consumed resources that await close correlation with the production and sales volume. Because when the sales volume increases, the cost increases, but when the sales volume decreases, the cost also decreases (GUERREIRO, 2011).

The Standard Costs system is a special costing system that essentially allows measuring production efficiency, as standard costs are predetermined costs. However, not all predetermined costs are standard costs (OLIVEIRA, *et. al.*, 2010). According to Padoveze (1997), the standard cost has in view the actual cost to be calculated, it has to use past information, thus the concept of standard cost emerged, as a way of anticipating the information on the costs of the products. Otherwise, the Standard Cost is calculated based on future events of desired costs, costs that may or may not happen in the company’s reality. In this way, managers want to know not how much it cost, but how much it will cost. Once the cost is determined in advance, the actual cost can be compared with it and its differences analyzed (CAGGIANO & FIGUEIREDO, 1997).

The *Reichskuratorium für Wirtschaftlichkeit* (RKW) costing system, which emerged in the period after the First World War in 1918 in Germany, to face the rampant inflation, where a kind of Institute of Economic Studies was created, having among its functions the control of prices. For that, it was a systematic way, where the proposal of a chart of accounts with the concept of responsibility centers. Its chart of accounts was a practical instrument that would allow the disclosure of useful information for business management (SOUZA & CLEMENTE, 2011).

According to Martins (2010), the original RKW model considers the opportunity cost, referring to the return on equity. The aforementioned author highlights the usefulness of the method in considering the apportionment of total costs and expenses, expressing that in this way it is possible to reach the “produce and sell” value, then simply adding the desired profit to get the last sale price.

In 1937, the Reich Ministry of Economy, based on studies and suggestions by the RKW, proposed by the German economist Eugen Schmalenbah (1873-1955), put it into effect, by a decree, which recommended the use of a distribution sheet for indirect costs and expenses. Thus, the Absorption Costing methods that make use of this Cost Location Map, including costs and expenses, became known because of the RKW system (SOUZA & CLEMENTE, 2011).

The Activity-Based Costing (ABC) criterion is a cost system that differs from conventional costing methods because of its way of applying and distributing indirect costs within organizations. The chief characteristic of ABC costing is to consider the activities developed as an original source of costs for products and services. Activity-based costing is a method created in the United States in the mid-1980s and was developed to significantly reduce the distortions caused by the arbitrary apportionment of indirect costs (CREPALDI, 2006).

From a conceptual point of view, Custeio ABC understands the business as a set of processes, where each step involves a series of activities. The costing object is no longer the product and becomes the activity, as these are the ones that consume resources, the cost information, and disaggregated by activity. Thus, it can be said that the ABC costing system that seeks to track a company's expenses by monitoring them in terms of resource consumption, within the multiple activities performed (SOUZA & CLEMENTE, 2011).

This costing system is for management, which provides economic information for making operational and strategic decisions. It is one of the most powerful business strategies in recent years, through which companies cut waste, improve services, evaluate quality initiatives, drive for continuous improvement, calculating with adequate precision the costs of their products (CREPALDI, 2006).

The Absorption Costing System comprises the appropriation of all production costs for the products and/or services produced, considering all the characteristics of Cost Accounting. The forerunners of this system conceived a model in which it is possible to appropriate to products all the costs incurred for their manufacture (SOUZA & CLEMENTE, 2011). Thus, when analyzing its origin on the factory floor, it has as a theoretical assumption

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that the production of goods is the generating element of wealth for the firm, therefore; it aims to monitor production in terms of volume and costs.

Costing by Absorption or Full Costing comprises appropriating all costs (whether fixed or variable) to the production of the period. Non-manufacturing expenses (expenses) are excluded. It is the method derived from the application of the fundamental principles of accounting in Brazil, adopted by commercial and tax legislation. It is not an accounting principle, but a method arising from the application of that principle. Thus, the method is valid for the presentation and payment of Income Tax (CREPALDI, 2006).

The chief characteristic of Absorption Costing is the difference between costs and expenses, where costs are expenses that occur in the production environment and expenses are expenses that occur in areas outside the production environment. Thus, costs are attributed to products and period expenses are period expenses (GUERREIRO, 2011). Table 1 seeks to show the costing processes described in this study in a very simplified way.

Table 1: Simplified statements of the costing processes described in this study.

Types of Expenses	Costing Methods				
	Primary Cost	Direct or Variable Costing	Absorption costing	ABC costing	RKW costing
Raw material, direct materials and packaging					
Direct Labor (Workers' Salary)					
Fixed and Variable					
Costs General Industrial Expenses					
Depreciation					
Administrative and Commercial Labor					
Administrative and Commercial Expenses					
Financial expenses					

Source: Lima & Moraes Filho (2016, p. 533), with changes made by the authors.

To operationalize this costing method, it starts by classifying costs into direct and indirect costs, where those that are easily and reliably accountable by product unit are classified as direct costs (SOUZA & CLEMENTE, 2011). Specialized literature has insisted on presenting as direct costs those associated with direct material and direct labor.

This costing method can be divided into three steps: in the first, it is necessary to separate the costs of products from the cost of the period. In the second, direct product costs are assigned to specific products, while indirect costs are assigned to cost centers. Finally, in the third step, the indirect costs are distributed from the center to the products according to

their use. Where the sum of direct and indirect costs distributed forms the cost of the product (CREPALDI, 2006).

For Souza & Clemente (2011), whatever the Absorption Costing variant used, the crucial issue boils down to two procedures: elaboration of the Indirect Costs Location Map and definition of the apportionment criteria, which should be based on the knowledge about the production process and must be constantly updated.

4.3. Strategic cost management as an instrument for decision making

The success of a company depends not only on implementing a Cost System, there needs to be an improvement in its processes, including the management process with the participation of the entire company team, providing good planning, excellent strategies, and favoring decision making. Once implementing the Cost System is finished, the data found must manage managerial information, whose branch of Accounting has the aim of providing tools to company administrators to help them in their functions. Being aimed at the best use of the company's economic resources, through an adequate control carried out by a management information system (CREPALDI, 2006).

Through this, a strategic cost management must be understood as an instrument for decision-making, going beyond cost spreadsheets, as the information got by this area can come to prepare the formation of the sales price, analyzing between the variables (cost x volume x profit), making it possible to determine indicators such as the financial equilibrium point, the organization's contribution and safety margin, as well as enabling the visualization of the forms of operational leverage.

4.4. Variable analysis: costs x volumes x profits

In using costs to aid decision-making, the forecast or planning of the company's profit is an important point, where in the set of procedures, called Cost-Volume-Profit Analysis (CVL), the influence caused by changes is determined quantity sold and costs. In fact, the foundations of this analysis are closely related to the use of cost systems to support short-term decision-making (BORNIA, 2010).

The analysis of the CVL relationship seeks to present the behavior of costs and profit as a function of the level of activity. Cost-volume-earnings analysis considers costs and revenues as functions of the level of production sold in a period. This relationship provides

valuable information about the company's cost structure and operational risk (SOUZA & CLEMENTE, 2011).

A decision can often be made to produce a less profitable mix (types and/or variations) of sales, intending to open up new markets or establishing a stronger position in a particular market. In these cases, the Cost x Volume x Profit analysis provides managers with the possibility of calculating the cost of this strategy in terms of profit (CAGGIANO & FIGUEIREDO, 1997).

4.5. Costing systems in the lean manufacturing and lean accounting context

The proposal of Lean Manufacturing is to increase the efficiency of the production system, eliminating waste such as waiting, excess inventory, over production, movements, transport, over processing, defects, underutilized people (ORTIZ, 2006), besides implementing a continuous improvement system (Kaizen), specify value and standardize the process (MEDEIROS *et. al.*, 2017).

Medeiros *et. al.* (2017), argue that traditional costing systems are conceptually not prepared to operate efficiently in the Lean Manufacturing production model, implying the need for improvements in the Accounting system. Where many industries have gone through processes of physical and cultural transformations, necessary to adopt such a concept (ABUTHAKEER *et. al.*, 2010).

In the period before the adoption of Lean Accounting and because of the growing demand for changes in Traditional Accounting, Activity-Based Costing (ABC) appears in this transition, a first response to the lack of costing methods for lean manufacturing companies (LÓPEZ *et. al.*, 2010). The proposal to use the ABC costing method in modern manufacturing is to facilitate the identification of activities, making the link between operations and resource costs (GUNASEKARAN & SARHADI, 1998).

However, the application requires continuous effort from employees in researching their preparation (STOUT & PROPRI, 2011). Given the problems encountered in the ABC method, the Time-Driven Activity-Based Costing (TDABC) emerges, a model that eliminates the time-consuming and subjective need for the process of interviews and inspections, making it more practical to update cost information through equations time (OKER & ADIGUZEL, 2010).

The advantage over its predecessor (ABC) lies in the simplification of the costing process, as TDABC eliminates the costly research process, in order to gather information on

the allocation of costs of resources and activities before directing you to the object of cost. Its proposal is to allocate resource costs using a leaner structure, based on equations of time, capacity cost rate and base time spent on each operation (KAPLAN & ANDERSON, 2007; OKER & ADIGUZEL, 2010).

From this moment on, companies adopting the Lean Manufacturing philosophy had these two costing methods (ABC and TDABC), where the actual adoption of Lean Accounting brings with it Value Stream Costing (VSC), a costing method that focuses the firm's attention on the resources being used across the value chain, rather than on individual products (MASKELL & BAGGALEY, 2004).

The VSC makes a connection between the operational aspects and Lean Accounting, meeting the needs of Lean Manufacturing companies, eliminating the need for calculations in the allocation of indirect costs (GRACANIN *et. al.*, 2014). The applicability of TDABC in companies with an environment of great instability and unpredictability can limit the application of the model, as this type of limitation is linked to the elaboration of the time equations, and the time required for execution and the intensity of resource consumption (SOUZA *et al.*, 2010).

Value Stream Costing proposes to cost the production process by mapping the value stream without activities qualification (in terms of cycle time, series change, distance, etc.). The conceptual essence of the VSC is defined by the idea that, by encouraging the categorization of costs by departments, the method proposes to organize them by value stream, which, in turn, is related to lean manufacturing, while the analysis of costs per department are linked to traditional production techniques (LÓPEZ *et. al.*, 2010).

For Medeiros *et. al.* (2017), the VSC results from the evolution of Cost Accounting because of the principles of Lean Manufacturing and Lean Accounting. Where the method follows the value stream mapping principles, which use the concepts provided by Lean to map and identify the value stream of the production process.

VSC is a system that shows costs, based on the value stream and can provide more relevant information for Lean companies, proposing better internal cost management (McVAY, *et al.*, 2013). However, as this costing method is quite current, there are few practical applications, justifying studies aimed at a particular segment.

4.6. Interdisciplinary discussions between accounting and production engineering

Martins (2010), already pointed out that all indirect costs have a certain subjectivity, to a lesser or greater degree, when identified, estimated and appropriated to the different productive activities, which, when finished, consider the final cost per unit produced, in a period and/or condition. They are ways of measuring the efforts and resources applied in the manufacture of one or several products (BORNIA, 1995). However, considering that each method appropriates costs specifically, when the issue is indirect costs, one should look for the one with the least distortions, and the apportionment is carried out using a rational logic as possible (MARTINS, 2010).

Regarding the use of data, the costs must be distributed among operational tasks, and later on by indirect production activities (FARIAS et al., 2020). Although the accountant has a broader view of the costing systems, whether by having access to an organization's Chart of Accounts, mainly for understanding the legislation, and even recoverable taxes, according to the tax regimes (Actual or Estimated Profit). It is the production engineer who works on the factory floor (re)orienting production processes more efficiently, adjusting products, optimizing resources and providing better results.

Therefore, it is necessary to invest in conditions that improve the integration and communication of the work team, to act more in a multi and interdisciplinary way, overcoming the departmentalization adopted for years in several companies, and which still represents isolation of these professionals. Understanding that these areas of knowledge complement each other, together they are essential for the planning, control and execution of industrial processes, especially in an increasingly globalized and competitive business environment.

5. Conclusion

This article sought to recover the origins and definitions of the concepts, terms and methods prevalent in Brazilian Cost Accounting, which have been incorporated by Management, Production Engineering and related areas. Given the breadth of existing interpretations, this systematic literature review was justified, recognizing that it does not exhaust the discussions and research on the subject. However, the study is positioned as an effort to standardize concepts, nomenclatures and costing methods in the industrial context.

Given the complexity of the processes and the coexistence of distinct, subjective or strictly disciplinary logics, it is understood that the subject is not concluded, especially considering the limited theoretical discussions on these interactions in the literature. The

transfer of knowledge and the association of new concepts, nomenclatures and costing methods are also fragile, especially in times of post-pandemic economic recovery, disorganized Distance Education (DE) and ungoverned digital content production.

When you consider that determining the ideal selling price for a product or commodity aims to cover all of an organization's costs and expenses, providing a desired profit, you recognize the complexity of this process in a competitive market governed by the law of supply and demand. Therefore, defining the sales price has become an extremely important task in today's computerized and globalized era, requiring the growing collaboration of economists, accountants, administrators, production engineers and related professionals (MARTINS, 2010).

The contribution of this work is to consolidate scattered information on industrial costs, as well as pointing out the need for more effective interaction between areas of knowledge. In the current economic context, the joint action of these areas with a holistic view of processes is vital for the planning, control and execution of industrial processes, discouraging departmentalized approaches.

Although Cost Accounting uses its own terminology to align the concepts of expenses, investments, costs, expenses, revenues and others, it is intrinsically associated with General Accounting, being the main source of information on a company's costs. This connection justifies its designation as the language of business (SILVA, 2016).

Even though it is not of the greatest interest to other areas of knowledge, it is important to understand this context in order to have good strategic management, as well as to make the best decisions, fundamentally understanding all the processes of formation and organization of the company's costs, since Accounting and Management are powerful and inseparable pairs (SILVA & GARBRECHT, 2016).

By instigating debate and contributing to the standardization and optimization of management, tax and costing processes in production organizations that adopt its premises, this work achieves its objective, especially when presenting a synthesis organized through figures 01 and 02 of this article. However, it recognizes its limitations, both in theoretical and practical aspects, due to the diversity of training, education and culture, which directly impacts on the interpretation of accounting practices applied to manufacturing.

As an additional limitation of the study, points out that it did not seek to propose indications on how to minimize the effects of different interpretations and practical applications in different contexts, considering, for example, the costs that people with different backgrounds can raise about the same process. This gap, as well as the need to

Coeslak, M.; Cieslak, A.M.; Menon, G.; Jung, M.A.; Antunes, A.C.; Gonzaga, C.A.M. measure the development of these interpretations and applications in specific industrial segments, emerges as an area of research to be explored in future studies.

6. References

ABBAS, K.; GONÇALVES, M. N.; LEONCINE, M. Os métodos de custeio: vantagens, desvantagens e sua aplicabilidade nos diversos tipos de organizações apresentadas pela literatura. *ConTexto*, vol. 12, n. 22, p. 145-159, 2012.

<https://seer.ufrgs.br/index.php/ConTexto/article/view/33487>

ABUTHAKEER, S. S.; MOHANRAM, P. V.; KUMAR, G. M. Activity based costing value stream mapping. *Lean Thinking*, vol. 1, n. 2, p.51-64, 2010.

<https://silo.tips/download/leanthinking-journalhomepagewwwthinkingleancom-ijlt-activity-based-costing-value>

ATKINSON, A. A.; BANKER, R. D.; KAPLAN, R. S.; YOUNG, M. *Contabilidade gerencial*. São Paulo: Atlas, 2000. Tradução de Management Accounting (2. ed.). Englewood Cliffs: Prentice Hall, 1997.

BARBOSA, C.; NASCIMENTO, C. A. D.; ABDOLLAHYAN, F.; & PONTES, R. M. *Gerenciamento de custos em projetos*. Rio de Janeiro: Editora FGV, 2014.

BARRETO, G. *Manual do Contador*. Belo Horizonte: Ed Líder, 2003.

BERNARDI, L. A. *Política e formação de preços: uma abordagem competitiva sistêmica e integrada*. (2.ed.). São Paulo: Atlas, 1998.

BEUREM, I. M. *Gerenciamento da informação: um recurso estratégico no processo de gestão empresarial*. São Paulo: Atlas, 1998.

BORNIA, A. C. *Análise gerencial de custos: aplicação em empresas modernas* (3. ed.) São Paul, Editora Atlas, 2010.

_____. *A fusão de postos operativos no método da unidade de esforços de produção*.

In Anais do IV Congresso Internacional de Custos e II Congresso Brasileiro de Gestão Estratégica de Custos (pp. 481-491). Campinas: Unicamp, 1995.

BRIZOLA, J.; FANTIN, N. Revisão da literatura e Revisão sistemática da literatura. *Revista de Educação do Vale do Arinos* [S. l.], vol. 3, n. 2, 2016. DOI: [10.30681/relva.v3i2.1738](https://doi.org/10.30681/relva.v3i2.1738).

CAGGIANO, S.; FIQUEIREDO, C. P. *Controladoria: teoria e prática*. (2.ed). São Paulo: Atlas, 1997.

CARVALHO, M. M.; RABECHINI, R. J. *Fundamentos em gestão de projetos: construindo uma competência para gerenciar projetos*. São Paulo: Editora Atlas, 2011.

CERVO, A. L.; BERVIAN, P. A. *Metodologia científica: para uso dos estudantes universitários*. São Paulo: McGraw-Hill do Brasil, 1983.

Coeslak, M.; Cieslak, A.M.; Menon, G.; Jung, M.A.; Antunes, A.C.; Gonzaga, C.A.M.

CORONADO, O. *Contabilidade gerencial*. São Paulo: Saraiva, 2006.

CREPALDI, A. S. *Contabilidade gerencial: teoria e pratica*. (3.ed.). São Paulo: Atlas, 2006.

FARIA, B.C.; VALE, J. W. S. P.; FACIN, A. L. F.; CARVALHO, M. M. Principais desafios na identificação e mensuração de custos indiretos em projetos: um estudo de caso múltiplo. *Gestão & Produção*, vol. 27, n. 1, e4913, 2020. <http://doi.org/10.1590/0104-530X4913>

GIL, A. C. *Métodos e técnicas de pesquisa social*. (5.ed.). São Paulo: Atlas, 2009.

GRACANIN, D.; BUCHMEISTER, B.; LALIC, B. Using cost-time profile for value stream optimization. *Procedia Engineering*, vol. 69, p. 1225-1231, 2014. <http://dx.doi.org/10.1016/j.proeng.2014.03.113>

GUERREIRO, R. *Estruturação de sistemas de custos para a gestão da rentabilidade*. São Paulo: Atlas, 2011.

GUNASEKARAN, A.; SARHADI, M. Implementation of activity-based costing in manufacturing. *International Journal of Production Economics*, n. 56-57, p. 231-242, 1998. [http://dx.doi.org/10.1016/S0925-5273\(97\)00139-4](http://dx.doi.org/10.1016/S0925-5273(97)00139-4)

IUDÍCIBUS, S. *Teoria da contabilidade*. (4.ed.). São Paulo: Atlas, 1994.

_____. *Contabilidade gerencial*. São Paulo: Atlas, 1998.

JANTSCH, A. P.; BIANCHETTI, L. (Orgs.) *Interdisciplinaridade: para além da filosofia do sujeito*. Petrópolis: Vozes, 2002.

KAPLAN, R. S.; ANDERSON, S. R. *Time-driven activity-base costing: a simpler and more powerful path to higher profits*. Massachusetts: Harvard Business School Press, 2007.

KLEIN, J. T. *Interdisciplinarity: history, theory, and practice*. Detroit: Wayne State University Press, 1990.

MARCONI, M. A.; LAKATOS, E. M. *Fundamentos da metodologia científica*. 8.ed. São Paulo: Atlas, 2017.

LEIS, H. R. Para uma reestruturação interdisciplinar das ciências sociais: a complexa tarefa de enfrentar os desafios da problemática ambiental sem cair no senso comum da sociedade civil. *Ambiente & Sociedade*, Ano IV, No. 8, 2001. Junho. <https://doi.org/10.1590/S1414-753X2001000800011>

LENOIR, Y.; HASNI, A. La interdisciplinaridad: por un matrimonio abierto de la razón, de la mano y del corazón. *Ibero-Americana de Educación*, No. 35, 2004.

LIMA, F. F.; MORAES FILHO, R. A. Gestão estratégica de custos: custeio por absorção em pequenas empresas em Recife, PE, Brasil. *Interações*, Campo Grande, MS, vol. 17, n. 3, p. 528-541, jul./set., 2016. [https://doi.org/10.20435/1984-042X-2016-v.17-n.3\(14\)](https://doi.org/10.20435/1984-042X-2016-v.17-n.3(14))

Coeslak, M.; Cieslak, A.M.; Menon, G.; Jung, M.A.; Antunes, A.C.; Gonzaga, C.A.M.

LOPEZ, P. R. A.; SANTOS, J. F.; ARBÓS, L. C. Lean manufacturing: costing the value stream. *Industrial Management & Data Systems*, vol. 113, n. 5, p. 647-668, 2013.

<http://dx.doi.org/10.1108/02635571311324124>

MARION, C. J. *Contabilidade básica*. (10.ed.). São Paulo: Atlas, 2009.

MARTINS, E. *Contabilidade de Custos*. São Paulo: Editora Atlas, 2010.

MARTINS, H. H. T. S. Metodologia qualitativa de pesquisa. *Educação e Pesquisa*, vol. 30, n. 2, p. 289-300, 2004. <http://dx.doi.org/10.1590/S1517-97022004000200007>

MASKELL, B. H.; BAGGALEY, B. *Practical lean accounting: a proven system for measuring and managing the lean enterprise*. New York: Productivity Press, 2004.

MEDEIROS, H. S.; SANTANA, A. F. B.; GUIMARÃES, L. S.O uso dos métodos de custeio nas indústrias de manufatura enxuta: uma análise da literatura. *Gestão & Produção*, São Carlos, vol. 24, n. 2, p. 395-406, 2017. <http://dx.doi.org/10.1590/0104-530X2183-16>

McVAY, G.; KENNEDY, F.; FULLERTON, R. *Accounting in the lean enterprise: providing simple, practical, and decision-relevant information*. New York: Productivity Press, 2013.

MORANDI, M. I. W. M.; CAMARGO, L. F. R. *Revisão sistemática da literatura*. In: DRESCH, A; LACERDA, D. P.; ANTUNES JR, J. A. V. Design science research: método e pesquisa para avanço da ciência e da tecnologia. Porto Alegre: Bookman, 2015.

MORIN, E. *A cabeça bem feita: Repensar a reforma, reformar o pensamento*. (8.ed.). Rio de Janeiro: Bertrand Brasil, 2004.

OKER, F.; ADIGUZEL, H. Time-driven activity-based costing: an implementation in a manufacturing company. *Journal of Corporate Accounting & Finance*, vol. 22, n. 1, p. 75-92, 2010. <http://dx.doi.org/10.1002/jcaf.20646>

OLIVEIRA, M. L.; PEREZ, H. J.; SILVA, S.A. C. *Controladoria estratégica*. (6.ed.). São Paulo: Atlas, 2010.

ORTIZ, C. A. *Kaizen assembly: designing, constructing, and managing a lean assembly line*. New York: CRC Press, Taylor & Francis Group, 2006.

PADOVEZE, C. L. *Contabilidade gerencial: um enfoque em sistema de informação contábil*. (3.ed.). São Paulo: Atlas, 2000.

SÁ, A. *A evolução da contabilidade*. São Paulo: Ed. Thompson, 2006.

SANTOS, J. A. *Gestão de Projetos*. Curitiba: Universidade Positivo, 2015.

SANTOS, J. J. *Manual de contabilidade e análise de custos*. 7. ed. São Paulo: Atlas, 2017.

SILVA, E. J.; GARBRECHT, G. T. *Custos empresariais: uma visão sistêmica do processo de gestão em uma empresa*. Curitiba: Intersaberes, 2016.

SILVA, J. M. *Contabilidade de custos*. Maringá: UniCesumar, 2016.

Coeslak, M.; Cieslak, A.M.; Menon, G.; Jung, M.A.; Antunes, A.C.; Gonzaga, C.A.M.

SOUZA, A. A.; AVELAR, E. A.; BOINA, T. M.; RAIMUNDINI, S. L. Análise da aplicabilidade do time-driven activity-based costing em empresas de produção por encomenda. *Revista Universo Contábil*, vol. 6, n. 1, p. 67-84, 2010.

<http://dx.doi.org/10.4270/ruc.2010104>

SOUZA, A.; CLEMENTE, A. *Gestão de custos*. (2.ed.). São Paulo: Atlas, 2011.

SOUZA, M. A.; DIEHL, C. A. *Gestão de custos: uma abordagem integrada entre contabilidade, engenharia e administração*. São Paulo: Atlas, 2009.

STOUT, D. E.; PROPRI, J. M. Implementing time-driven activity-based costing at a medium-size electronics company. *Management Accounting Quarterly*, vol. 12, n. 3, p. 1-11, 2011.

<https://www.semanticscholar.org/paper/Implementing-Time-Driven-Activity-Based-Costing-at-Stout-Propri/3a1851fad50735065b839c49701c577c4009501>