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Analysis of the Cost Management System in an Artisanal Microbrewery: An Activity-Based Costing Proposal

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ABSTRACT

This study analyses the cost management system of an artisanal microbrewery, focusing on the degree of formalisation and use of cost information and its adequacy for managerial decision-making. The research adopts a mixed-methods case study approach, combining financial analysis for the 2019–2023 period with two diagnostic questionnaires addressing the maturity of the cost system and the company's technical and productive characteristics. The findings indicate limitations in the current cost management system, particularly in its ability to provide sufficiently detailed and traceable information as operational complexity increases. Based on these findings, the study develops an Activity-Based Costing (ABC) model, operationalised through an Excel-based tool for monthly use. The results suggest that the relevance of an ABC system in manufacturing microenterprises depends on the emergence of specific organisational conditions associated with increasing operational complexity, rather than solely on organisational size. The proposed model is designed to improve the allocation of indirect costs and provide more useful cost information to support managerial decision-making.

KEYWORDS

Activity-Based Costing (ABC), Cost Management, Management Accounting, Manufacturing Microenterprises, Organisational Complexity, Decision-Making

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1. Introduction

In increasingly competitive markets, characterised by high cost volatility and pressure on margins, efficiency in resource management has become a key factor in corporate finance for ensuring business sustainability, particularly for small-scale and artisanal firms. In this context, management accounting—and, more specifically, cost systems—plays a crucial role by providing relevant and timely information that supports better resource allocation and strategic decision-making.

The craft beer industry in Spain has experienced significant growth, with an increase of over 400% in the number of breweries between 2010 and 2020. This expansion has been driven by strategies focused on quality and product differentiation, meaning that artisanal microbreweries do not primarily compete on price. As a result, having accurate cost information becomes essential for assessing profitability and supporting efficient management.

Many microbreweries still operate with poorly standardised processes and informal cost management structures. This makes it difficult to accurately determine product profitability and limits informed decision-making, potentially threatening the sustainability of these firms if management tools are not developed in line with increasing operational complexity.

Castello Beer Factory, located in the Valencian Community, represents a relevant case for examining the challenges of cost management in growing artisanal manufacturing firms. It is an artisanal microbrewery that has experienced sustained commercial growth in recent years, consolidating its position within the local craft beer ecosystem.

The financial analysis conducted identified signs of pressure on profitability and certain operational imbalances which, although not compromising short-term business continuity, suggest the need to reassess how resources are being managed. Accordingly,

this study examines the current cost accounting system based on the firm's own perception regarding its level of formalisation, its limitations, and its use in decision-making.

This research addresses a practical management problem through the diagnosis of the current system and the design of an improvement proposal based on the Activity-Based Costing (ABC) model, aimed at enhancing the quality, traceability, and usefulness of cost information for decision-making. While Activity-Based Costing has been extensively discussed in the literature, empirical evidence on its application in artisanal microenterprises remains limited, particularly in contexts where increasing operational complexity is not accompanied by formal cost management systems. Rather than testing the effectiveness of ABC after implementation, this study focuses on identifying the organisational conditions that justify its adoption in a growing artisanal manufacturing firm.

Within this framework, the study is guided by the following research question: Does the current cost management system in an artisanal microenterprise provide adequate information to support strategic and operational decision-making in a context of production growth?

The study provides applied evidence based on the analysis of a specific case, allowing the identification of limitations in the existing cost management system and their implications for managerial decision-making. Beyond the diagnosis itself, the study contributes to the literature by identifying organisational characteristics—such as increasing operational complexity, product diversity, and the growing relevance of indirect costs—that create the conditions under which an Activity-Based Costing approach becomes particularly appropriate for small manufacturing firms. Rather than proposing ABC as a universal solution for microenterprises, the findings illustrate the contextual factors that support its adoption and demonstrate how a structured cost management model can be adapted to the operational reality of artisanal production environments.

2. Study context

The craft beer industry in Spain has gained significant relevance over the past decade, consolidating itself as a differentiated alternative to the industrial brewing model. This growth has been driven by consumers who value local identity, production quality, and

proximity to the product. Although its market share remains relatively small—around 1.1% of the total national beer market—its economic impact exceeds €350 million annually and is particularly notable in non-capital regions, where more than 85% of breweries are located (Asociación Española de Cerveceros Artesanos Independientes, 2020; Ministerio de Agricultura, Pesca y Alimentación, 2024).

The artisanal model is characterised by small-scale production, a diversified range of styles, the use of local ingredients, and a commercial strategy based on proximity and customer experience. More than 70% of microbreweries operate their own taprooms, and around 80% combine direct sales with mixed distribution channels. This ecosystem fosters a close relationship with customers but also presents significant operational management challenges.

Among the most common issues in the sector are the absence of formal cost accounting systems, difficulties in allocating indirect costs, and limited process standardisation. Decisions are often based on general estimates, making it difficult to calculate real margins by product or sales channel. In addition, the lack of specialised technical personnel limits the implementation of more advanced management control systems. These weaknesses are common even among established firms, affecting their ability to scale and sustain healthy margins in a competitive and fragmented market.

3. Theoretical Framework

3.1. Fundamentals of Management Accounting

Management accounting emerges as a natural evolution of traditional financial accounting. While the latter is oriented towards external users and governed by regulatory principles such as those established by the International Financial Reporting Standards (IFRS), management accounting is designed for internal decision-making. It adopts a strategic and flexible approach aimed at improving operational efficiency and organisational profitability.

Its origins can be traced back to the Industrial Revolution, when the need to control costs in increasingly complex production environments became evident. As noted by Drury (2018), over time more advanced analytical tools have been developed, allowing for a more precise evaluation of resource allocation, process efficiency, and profitability by product or business unit.

The main objective of management accounting is to provide useful information for decision-making, tailored to the specific characteristics and needs of each organisation. According to AECA (2003)[1], "management accounting is a tool that can be used to facilitate the control process through the preparation of information that allows the evaluation and improvement of organisational activities." This definition highlights both its operational and strategic nature, as well as its role in guiding internal decisions towards improved performance. Unlike financial accounting, it is not subject to external regulations, which gives it considerable flexibility to support both strategy and day-to-day operations.

Given its focus on internal decision-making, it is essential to establish appropriate criteria for cost calculation and allocation. The usefulness of the information generated depends largely on the methodology applied, as different costing approaches may lead to different interpretations of efficiency and profitability. In this sense, management accounting is operationalised through costing models, which function as technical tools aligned with managerial objectives.

Various costing models exist, each with specific characteristics that make them more or less suitable depending on the type of organisation, the level of automation, and management objectives:

- **Full costing** (absorption costing): assigns all production costs, both fixed and variable, to products. Its main advantage is that it provides a comprehensive view of total costs, which is useful for financial valuation and long-term strategic decisions. However, it may distort margins when fixed costs are high or capacity utilisation is low (Drury, 2018; Horngren et al., 2015).
- **Variable costing**: includes only variable costs associated with production volume, treating fixed costs as structural. This approach facilitates marginal analysis and supports short-term decisions such as pricing and acceptance of special orders (Kuster, 2021; Drury, 2018).
- **Standard costing**: establishes predetermined costs based on technical or historical data and compares them with actual costs, allowing the identification of

[1] Although the AECA (2003) reference may be considered temporally distant, it is used in this work due to its normative and foundational nature in the definition and classification of costs, whose basic concepts remain valid in current management accounting literature. Furthermore, these approaches continue to be widely cited and used as a framework in subsequent academic and professional work.

variances. It is particularly useful in environments requiring budgetary control and performance evaluation (Horngren et al., 2015).

- **Cost centre accounting**: allocates indirect costs to cost centres, which may correspond to production, service, or departmental units, before assigning these costs to products or other cost objects. This structure supports cost control and performance evaluation by providing information on the costs incurred within different organizational units (Drury, 2018).
- **Activity-Based Costing (ABC)**: links indirect costs to the activities that generate them and subsequently assigns these costs to products based on their consumption of activities. This method increases the accuracy of cost information and is particularly suitable for organisations with a high diversity of products or processes (Kaplan & Cooper, 1998; Bellido, 2003).

In addition, cost management systems can be structured in an organic way, when they are integrated into the general accounting system—ensuring consistency and automation—or in an inorganised way, when they are developed through independent tools such as spreadsheets. The latter offers greater flexibility and adaptability, which is particularly useful for small firms or sectors with low levels of standardisation, such as artisanal production.

Table 1 presents a comparative summary of the strengths, weaknesses, and cost allocation logic of each costing model.

Table 1. Comparison of Cost Models

Costing Model	Strengths	Weaknesses	Technical cost weighting method
Full costing	Comprehensive view of all costs; useful for accounting decisions	It can overload products with high fixed costs, distorting profitability.	All direct and indirect costs (fixed and variable) are added together and distributed proportionally.
Variable costing	Useful for tactical decisions; allows for marginal analysis	By excluding fixed costs, you may underestimate the true total cost of production.	Only direct variable costs are included, generally distributed by production volume.
Standard costing	Facilitates budget control and variance analysis	If it is not updated frequently, it can deviate significantly from the actual cost.	Predetermined costs based on historical or technical data, compared with actual costs to analyze deviations
Cost centre accounting	Facilitates departmental control; useful for budgeting	In integrated processes, it makes it difficult to accurately allocate resources to specific products.	Costs accumulated in centers, then distributed by criteria such as man-hours, energy consumption, etc.
ABC Costing	High traceability; allows for precise allocation of indirect costs	Complexity in implementation and the need to keep the activity map updated	Costs are allocated to specific activities, and then to products according to the consumption of each activity.

Furthermore, Casanova et al. (2021) point out that, in order to understand costs, it is necessary to identify their fundamental components, defining them as the resources required to produce a good or deliver a service. These are typically classified into three categories: direct materials, direct labour, and indirect costs. In relation to the most appropriate costing model, the authors note that each approach involves different accounting treatments, as well as specific advantages and limitations.

3.2. ABC model as an alternative to traditional cost management

The increasing operational complexity of firms, particularly in sectors with high product diversity such as craft brewing, has highlighted the limitations of traditional cost management systems. In this context, Activity-Based Costing (ABC) emerges as an effective alternative to conventional approaches, as it allows for a more accurate identification of the relationship between activities and the resources they consume. The ABC system focuses on analysing which activities generate costs and to what extent each product or line consumes them, significantly improving cost traceability and the assessment of unit profitability.

According to Ramos Farroñan et al. (2020), firms require tools that enable them to identify cost-generating activities in order to improve competitiveness and support decision-making. In this regard, ABC is presented as a key tool for understanding the relationship between activities, costs, and results. The same study cites multiple authors who emphasise the importance of ABC models and their contribution across different stages of management.

This approach represents a shift in how cost generation is understood within organisations. Casanova et al. (2021) argue that the foundation of this model lies in identifying the underlying causes of costs, which are ultimately the activities carried out by the firm in producing or delivering goods and services, and the resources associated with them. Similarly, Bellido (2003) explains that ABC is based on a clear causal relationship: it is not products that directly generate costs, but the activities required to produce them, which in turn consume resources.

From a methodological perspective, Bellido (2003) identifies the key elements required for implementing an ABC system:

- **Resources**: all inputs available to the organisation for carrying out its activities, including labour, materials, energy, infrastructure, and services.
- **Activities**: sets of actions performed to fulfil business functions. Activities consume resources and are the source of indirect costs.
- **Cost drivers**: factors that explain the variation in the cost of an activity and serve as the basis for allocating these costs to cost objects (e.g., labour hours, processed volume, number of orders).

- **Cost objects**: products, services, or customers to which costs are assigned.

Other studies have also outlined the methodological steps required to implement ABC systems, while highlighting certain conditions for successful adoption. Mahal and Hossain (2015) emphasise that strong top management support is essential, and that implementation should be led by a cross-functional team rather than being confined to the accounting department.

Today, ABC has gained relevance in environments characterised by a high diversity of products or services, such as the craft beer industry. By linking costs to the activities that generate them, the model improves cost traceability and profitability analysis by product line, enabling a more detailed understanding of resource consumption and facilitating the identification of non-value-adding activities.

3.3. Importance of Strategic Cost Management for Business Efficiency

The relationship between business strategy and the cost system constitutes a key factor for long-term success. A cost system should not be understood solely as an accounting tool for recording or allocating expenses, but as a strategic component integrated into the firm's management model. Its design and use directly influence the organisation's ability to formulate and implement effective strategic decisions.

When a firm defines its strategy—whether oriented towards cost leadership, product differentiation, or niche specialisation[2]—it requires accurate information about cost behaviour to assess the viability of its decisions. Without this alignment, inefficient decisions may arise, such as maintaining unprofitable products, setting inappropriate prices, or allocating resources to activities that do not create value. As Shank and Govindarajan (1993) note, "strategic cost management involves not only understanding existing costs, but also their structure, causes, and behaviour in relation to strategic decisions."

In this regard, Kaplan and Norton (1996) highlight that strategy-oriented organisations require both financial and non-financial indicators aligned with their objectives, with cost systems representing a key source of such information.

[2] These are different strategies a company can adopt depending on the industry or market in which it competes. What should be evaluated is the company's internal capabilities and competitive advantages. The management decisions a company makes will depend on the strategy it pursues.

Aligning strategy with the cost system allows firms to focus their efforts on activities that genuinely contribute to value creation. In this sense, a well-designed cost system acts as a managerial guide, providing reliable information on efficiency, profitability, and performance, and supporting decisions consistent with the firm's competitive positioning.

From this perspective, strategic cost management goes beyond the ex post recording of financial information and becomes a tool that directly contributes to business efficiency. As Gómez Ortiz (2018) argues, strategic cost management represents a broader approach to management accounting, incorporating cost analysis and value creation into decision-making.

Finally, recent literature in management control extends this perspective through the concept of Real Earnings Management (REM), understood as a set of operational decisions related to production, costs, or investment aimed at influencing firm performance. In this sense, García Osma, Gómez-Conde and López-Valeiras (2022) show that when control systems are used interactively and aligned with strategy, they contribute to improved efficiency and future performance by facilitating the identification and implementation of actions consistent with strategic objectives.

3.4. Impact of Strategic Cost Management in the Brewing Industry

The food industry, and particularly artisanal production, defines its strategic decisions based on the positioning it seeks to achieve within its sector. Gómez Ortiz (2018) relates competitive positioning to the relative position a firm occupies in its market and highlights product differentiation as a potential source of competitive advantage. This perspective is particularly relevant in artisanal contexts, where differentiation may be linked to product characteristics and the value perceived by customers.

In this context, artisanal firms must define their operational objectives in line with the activities that consume specific resources, which can be systematically identified, measured, and managed to sustain competitive advantage.

By way of illustration, the study conducted by Lees, Ellen and Brodie (2013) in a large Australian brewery shows that production control systems are oriented towards managing key operational cost drivers, such as energy efficiency, loss reduction, and process optimisation. This highlights that cost driver management extends beyond ex post accounting control and is directly embedded in operational processes.

At a smaller scale, Kuster (2021) analyses the economic viability of Uruguayan microbreweries through a multiple case study. In the absence of formal cost systems, the study applies variable costing and marginal analysis, identifying contribution margin per litre and break-even point as key indicators. The findings show that while contribution margins are relatively homogeneous, the production volume required to reach break-even varies significantly depending on the structure of fixed costs. In particular, firms with more developed organisational structures require higher activity levels to sustain profitability.

In this regard, Kuster (2021) concludes that profitability is not random but depends on the identification and management of key economic variables, allowing for a systematic analysis of their impact on results.

Overall, the evidence confirms that strategic cost management is a key factor in improving operational efficiency and profitability in the craft brewing sector. The presence of formal cost systems enables firms to identify activity thresholds, optimise resource use, and support more informed decision-making.

However, implementing such systems presents challenges in real contexts, particularly when production processes are diverse and resources are not consumed homogeneously. Traditional costing systems have been criticised for allocating indirect costs based on general criteria, which may distort cost information and negatively affect strategic decisions (Kannaiah, 2015).

Moreover, the literature indicates that inadequate allocation of indirect costs and poorly defined cost drivers hinder the generation of reliable cost information (Ramos Farroñan et al., 2020). As a result, these approaches fail to accurately reflect the economic reality of products, limiting profitability analysis (Casanova et al., 2021).

Given these limitations, it becomes necessary to adopt approaches that link costs to the activities that actually consume resources, in order to improve the accuracy and usefulness of cost information for managerial decision-making.

Hypothesis

In a context of productive growth, the current cost management system of Castello Beer Factory does not provide sufficiently precise, structured or traceable information to effectively support strategic and operational decision-making

4. Methodology

4.1. Research Design

This study is developed under an applied exploratory-descriptive research approach, focused on Castello Beer Factory, an artisanal microbrewery located in the Valencian Community. Its purpose is to diagnose the limitations of the current cost management system and to design a proposed system based on the Activity-Based Costing (ABC) model, adapted to the company's operational reality. The study is based on the use of multiple sources of information, combining both quantitative and qualitative evidence, and was conducted between July 2025 and January 2026.

The selection of Castello Beer Factory is justified by its representativeness as a growing artisanal microbrewery, making it an appropriate case for analysing the limitations of cost management systems in this type of organisation.

In a first stage, a financial analysis was carried out based on the company's historical financial statements for the years 2019–2021 and 2023, with the aim of identifying potential profitability pressures and assessing the need to review the cost system. In a second stage, diagnostic instruments specifically designed for this study were applied. These consisted of two questionnaires combining numerical scales from 1 to 10—allowing quantitative analysis—with open-ended questions aimed at capturing qualitative information on management practices and production processes.

Additionally, a data collection form developed in Excel was used to systematise internal data related to production, resource consumption, and costs. This allowed for a better understanding of the company's operational processes and provided an empirical basis for designing the proposed cost management model.

These sources enabled the integration of financial, operational, and managerial evidence, offering a more comprehensive view of both the company's economic performance and the limitations of its current cost management system.

The proposal is materialised in a tool fully developed in Excel, based on an ABC system and designed specifically for this company. Its construction combines elements such as macro-based automation, dynamic calculation formulas, and cost segmentation. The model is structured for monthly use, allowing the estimation of unit costs and margins in real time to support decision-making.

It should be noted that the proposed model corresponds to a conceptual and operational design developed from the information collected, and not to a system implemented or tested under real operating conditions. Therefore, the tool should be understood as a methodological approach aimed at improving cost management, rather than as empirical evidence of its impact on the organisation. Accordingly, its results should be interpreted in potential terms.

4.2. Data collection instruments

To evaluate the cost management system of the company under study, two instruments specifically designed for this research were applied: Questionnaire No. 1 on Cost System Maturity and Questionnaire No. 2 on Technical-Productive Aspects. The questionnaires combined open-ended, multiple-choice, and scale-based questions, allowing for the collection of both quantitative and qualitative information.

Questionnaire No. 1 is structured into four main dimensions: (i) cost recording and calculation by product, (ii) margin control, (iii) tools and processes, and (iv) use of information for decision-making. Each dimension includes a set of questions evaluated on a scale from 1 to 10, where higher values indicate a greater level of system formalisation and use. Some questions also include categorical options to capture the level of development of management practices, such as the use of information systems, frequency of review, and degree of integration of cost information into decision-making.

Questionnaire No. 2 focuses on collecting detailed information about the company's operational functioning. It addresses aspects related to production processes, resource consumption, cost structure, control practices, and the use of technological tools. This instrument combines quantitative scales and qualitative questions, allowing both the degree of process formalisation and the specific characteristics of the production system to be captured. This information is essential for understanding the company's operational logic and supporting the design of the proposed cost model.

The diagnostic instruments were specifically developed for this study based on a review of the literature on management accounting and cost systems, and adapted to the operational context of the company. Given the applied nature of the study, validation was carried out through internal review and discussion with the individual responsible for operational and financial management, ensuring clarity, relevance, and applicability of the questions.

The questionnaires were completed by the company's management, specifically by the partner responsible for operational and financial management, who has comprehensive knowledge of both production and management processes. The instruments were administered in digital format (Google Drive), allowing for autonomous completion by the respondent. Subsequently, follow-up clarifications were conducted to ensure the correct interpretation of the responses.

4.3. Data processing and analysis

The responses were standardised on a common scale from 1 to 10, where 1 represents the absence of the evaluated practice and 10 its full implementation, ensuring comparability of results. Data processing and analysis were carried out using Excel templates specifically designed for this study, allowing the information to be grouped by dimensions and represented graphically, facilitating the identification of strengths and weaknesses in the system.

For interpretation, results were classified into three levels: adequate (7–10), intermediate (4–6.9), and deficient (1–3.9). The consistency of the analysis is supported by the prior design and review of the instruments, as well as by the use of a standardised methodology that reduces interpretative bias and enables a coherent evaluation of the cost management system.

5. Field Analysis – Case Study of Castello Beer Factory

5.1. General Description of the Company[3]

Castello Beer Factory is an artisanal microbrewery based in Castelló de la Plana, in the Valencian Community. Founded in 2016, it originated as an initiative by three partners with previous homebrewing experience, who decided to professionalise their project through a proposal focused on product quality, creative design, and a strong commitment to local identity.

The company operates in the Polígono Estadio industrial area, where it has an artisanal production facility as well as a direct-to-consumer space. Its product portfolio includes a wide range of beer styles, from IPAs to special edition lagers, produced in controlled batches with a strong emphasis on differentiation. Over time, Castello Beer Factory has

[3] Information compiled from Castelló Beer Factory, n.d.and Okasional Beer, 2019.

consolidated its position as a recognised player within the regional craft beer sector, maintaining steady growth both in production volume and brand recognition.

Current annual production is approximately 80,000 litres, placing the company within the microbrewery segment according to standard industry classifications. This production scale allows for a high level of process control, but also requires increasing efficiency in resource use and a deeper understanding of actual operating costs.

In terms of organisational structure, Castello Beer Factory is characterised by a shared management model among its founding partners, who are involved not only in production activities but also in commercial, administrative, and strategic functions. While this structure enables agile decision-making, it also highlights the need for technical tools to support economic and financial analysis.

The company follows a segmented commercial strategy, differentiating between retail and wholesale customers, and adapting pricing policies and distribution channels accordingly. This approach has enabled the firm to build a diversified sales base, combining specialised retail outlets, bars, and direct sales, both on-site and online.

5.2. Financial Diagnosis

Financial analysis constitutes a key tool for understanding a company's real economic situation beyond superficial accounting results. Its application allows the identification of structural imbalances, operational weaknesses, and opportunities for improving resource allocation. In the context of this study, the analysis of the main financial indicators of Castello Beer Factory for the years 2019, 2020, 2021, and 2023 provides relevant evidence supporting the need to review the company's cost management system.

The methodology applied includes both vertical and horizontal analysis. Vertical analysis is used to determine the relative weight of each financial statement item within each year, while horizontal analysis allows for comparison over time through percentage variations between periods. The analysis covers key areas such as solvency and indebtedness, liquidity and payment capacity, and profitability and performance. For each area, the most relevant financial ratios are presented to support the analysis and its interpretation.

This financial evaluation enables an objective diagnosis of the company's current situation and provides an empirical basis for proposing improvements, such as the implementation of a more precise and strategically oriented cost management system.

It is important to note that this study does not aim to intervene in or provide recommendations regarding the company's financial strategy, investment decisions, or financing structure. Its scope is strictly limited to the domain of management accounting, with the objective of providing tools that allow the company to better understand how resources are allocated, which activities consume the most costs, and which products or business lines generate higher or lower levels of profitability.

5.2.1. Solvency and Indebtedness

Solvency and indebtedness indicators allow the assessment of a company's ability to meet its financial obligations and sustain its operations in the long term. A balanced financial structure combines an appropriate proportion of debt and equity, avoiding excessive exposure to financial risk. Table 2 presents the main solvency and indebtedness ratios.

Table 2. Solvency and debt ratios

Indicator	**2023**	**2021**	**2020**	**2019**
Warranty (Distance to bankruptcy)	3.91	4.03	4.01	2.45
Total Debt	0.34	0.33	0.33	0.69
Long-Term Debt	0.00	0.03	0.03	0.03
Short-Term Debt	0.34	0.30	0.30	0.66

The guarantee ratio reached a value of 3.91 in 2023, well above the range generally considered optimal (1.5–2.5). This indicates that the company holds sufficient assets to cover its liabilities and shows an upward trend since 2019, reducing bankruptcy risk. However, it may also reflect potential inefficiencies in asset utilisation and possible underuse of available resources.

Total indebtedness remains low (0.34 in 2023), suggesting a conservative capital structure and limited reliance on external financing. The company does not hold long-term debt, relying entirely on equity for its permanent financing structure. However, 100% of its liabilities are short-term, which exposes the firm to significant short-term financial pressure and represents a potential operational risk.

Overall, the company shows strong solvency, but its liability structure is highly concentrated in the short term, limiting its financial flexibility.

5.2.2. Liquidity and Payment Capacity

Liquidity measures the company's ability to meet its short-term obligations using its current assets. It is a key indicator of operational health and day-to-day financial stability. Table 3 presents the main liquidity and payment ratios.

Table 3. Liquidity and payment ratios

Indicator	2023	2021	2020	2019
Working Capital	54 676	36 436	21 226	927
General Liquidity	3.04	2.60	2.09	1.03
Acid Test	2.37	2.60	2.09	0.92
Immediate Treasury	1.17	1.48	0.36	0.23
NOF	79 108	59 196	40 716	28 285

In 2023, the company's working capital amounts to €54 676, showing a positive trend since 2019 and initially suggesting a solid liquidity position. However, operating working capital requirements reach €79 108, exceeding available working capital. This indicates that the company is not fully financing its operating cycle with permanent resources.

This imbalance suggests that apparent liquidity is being absorbed by the operating cycle itself, creating a financial gap that may affect the company's medium-term stability if not actively managed.

Such a mismatch could compromise long-term stability, potentially requiring the firm to seek alternative financing sources, restructure its asset financing strategy, or adjust its operational management to reduce working capital requirements. However, these aspects fall outside the scope of this study and are therefore not analysed in detail[4].

5.2.3. Performance and Profitability

Profitability is the most direct measure of a company's economic performance. Indicators such as EBITDA, ROA, and ROE allow the assessment of how efficiently resources are used to generate returns. Table 4 presents the main performance and profitability ratios.

[4] The ultimate objective of this study is not to intervene or issue recommendations on the company's operational financial management, such as its financing decisions, capital structure, or on possible restructuring strategies for working capital requirements (WCR).

Table 4. Profitability Ratios

Indicator	2023	2021	2020	2019
EBITDA	-12 073	14 275	22 161	7 346
ROA	-17.99%	6.86%	25.99%	10.35%
Margin	-8.39%	2.88%	8.34%	4.23%
ROE	-20.24%	4.84%	23.59%	10.85%
Financial Leverage	1.32	1.33	1.33	1.69
Net turnover (euros)	225 172	237 682	265 724	173 470

Profitability indicators show a significant deterioration in 2023. EBITDA turns negative (-€12 073), breaking the positive trend observed in previous years and reflecting a loss of operating performance capacity. This deterioration is reinforced by a negative operating margin (-8.39%), in contrast to the positive values recorded between 2019 and 2021, despite net revenue remaining at relatively high levels.

Similarly, both economic (ROA) and financial (ROE) profitability become negative in 2023 (-17.99% and -20.24%, respectively), indicating a destruction of value from both asset and equity perspectives. Financial leverage remains relatively stable at around 1,3, suggesting that the decline in profitability is not driven by increased indebtedness, but rather by a loss of operational efficiency.

The financial analysis highlights tensions in profitability and a deterioration in key indicators that are not explained by a decline in sales. However, this type of evidence does not allow for direct causal conclusions regarding the origin of these changes. Factors such as product mix variations, pricing strategies, or changes in operating costs may also explain these results.

In this context, the analysis should be interpreted as an indication of the need to improve the quality and level of detail of cost information, rather than as direct evidence of inefficiencies in the current cost management system.

5.3. Cost Management System Analysis

Based on the financial analysis presented in the previous section, several elements emerge that suggest the need to review and analyse the cost management system of Castello Beer Factory. This analysis aims to assess the degree of formalisation, the limitations in cost

allocation, and the extent to which available information is used, in order to better understand the factors that may be affecting the quality of information used in decision-making.

The company has demonstrated itself to be a solid project, with a sustained growth trajectory in revenues and a progressive consolidation within the craft beer sector. This commercial dynamism and business expansion are clear indicators of a value proposition well received by the market, allowing the company to strengthen its position despite economic disruptions such as those associated with COVID-19. However, this same growth entails increasing operational complexity and, consequently, requires greater precision in the internal management of resources.

The financial results of the most recent period reveal signs of tension in terms of profitability and economic efficiency. Although the company has increased its sales, the resources employed are not generating proportional returns. This highlights the need for more detailed and structured information to better understand cost behaviour and its impact on performance. In this context, analysing the cost management system becomes particularly relevant, especially regarding how costs are recorded, allocated, and used, with the aim of improving the traceability, quality, and interpretability of the available information.

In this sense, reviewing the current cost management system is not driven by an urgent situation, but rather by a strategic opportunity to improve efficiency, enhance the traceability of resource consumption, and strengthen the informational basis for decision-making in a context of business growth.

5.3.1. Overall Diagnostic Results

The integrated results derived from the questionnaires applied to the company allow for a clear identification of both strengths and weaknesses in the cost management system of Castello Beer Factory. The main findings are presented below.

Figure 1 presents the results of Questionnaire No. 1 on Cost System Maturity by analytical block. The results indicate that the dimension perceived as most important and most developed within the cost management system is its use as a support for managerial decision-making.

Figure 1. Results of Questionnaire No. 1 by analytical block

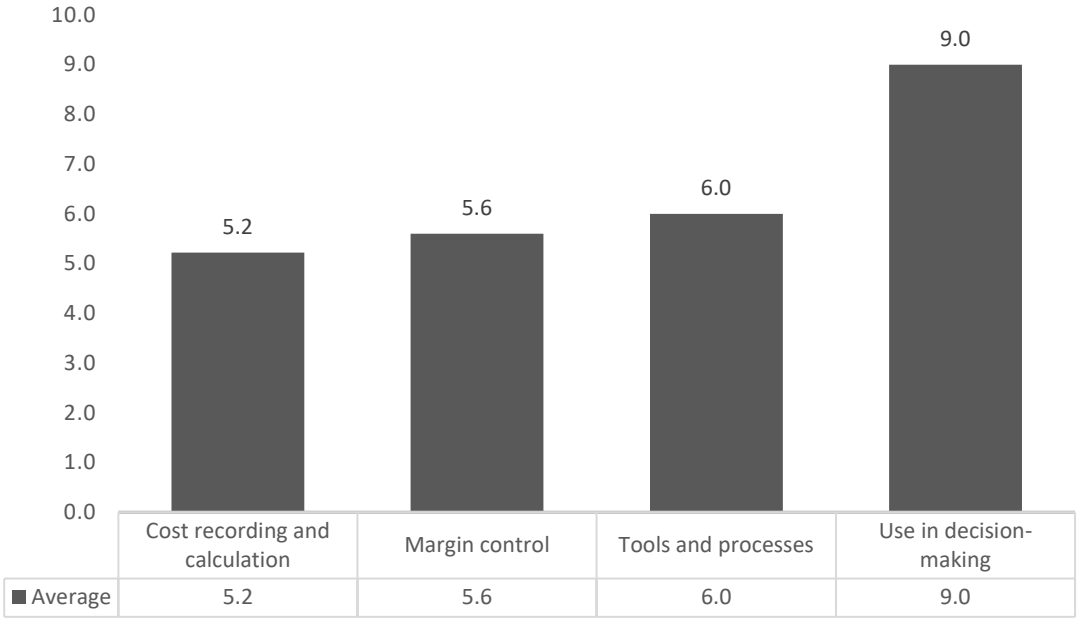
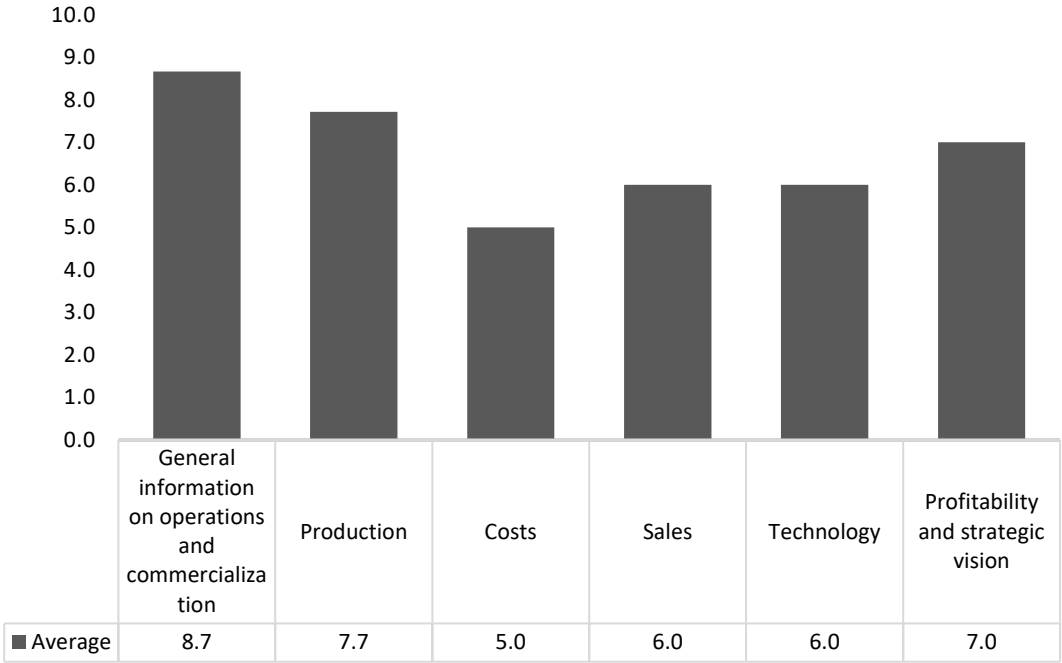


Figure 2 presents the results of Questionnaire No. 2 (technical–productive) by analytical block. The results show that the cost dimension is perceived as the weakest and least developed within the production process.

Figure 2. Results of Questionnaire No. 2 by analytical block



This highlights a relevant point: while the cost management system is perceived as highly valuable for decision-making at the managerial level, the operational dimension of costs within the production process appears to be the weakest and therefore requires significant improvement.

Based on the questionnaire results, the following strengths can be identified:

- **Direct cost management:** The company maintains relatively clear control over raw material costs, which form the basis of its current system.
- **Preliminary unit cost estimation:** Although no formalised procedure exists, the company performs approximate calculations of unit costs by product, providing a starting point for further development.
- **Identification of production stages:** The team clearly recognises the main stages of the production process (mashing, fermentation, maturation, and packaging), facilitating the mapping of key activities.

The main weaknesses identified are as follows:

- **Separation of fixed and variable costs:** There is no systematic procedure to distinguish between them, limiting profitability analysis and break-even estimation.
- **Inclusion of indirect costs:** Costs such as distribution, marketing, and administration are only partially considered or excluded, leading to an underestimation of total costs.
- **Production efficiency control:** There are no detailed records of time or energy consumption by production stage, hindering the identification of cost drivers and the measurement of operational efficiency.
- **Margin tracking:** Although selling prices and basic costs are known, there is no structured monitoring of margins by product or regular break-even calculations.

The analysis also reveals significant structural limitations. The absence of a systematic distinction between fixed and variable costs, the limited incorporation of indirect costs, the lack of production efficiency records, and the absence of standardised procedures for unit cost calculation indicate that the current information lacks the precision and reliability required to support strategic decision-making.

In practical terms, this means that the company is able to manage its day-to-day operations, but does not have the necessary control tools to accurately assess the profitability of each product or to anticipate financial scenarios.

Finally, according to the scale defined in this study, the overall average places the cost management system at an intermediate level (between 4 and 6.9). This suggests a system that functions partially and provides operational utility, but presents limitations that restrict its impact on management. This result confirms that the current system can be improved to better respond to the competitive challenges of the craft beer sector.

Overall, the analysis identifies specific areas for improvement and clearly establishes the need to move towards a more robust, transparent, and strategically aligned cost management system.

6. Cost Management System Proposal

6.1. Methodological Considerations

The proposed tool was designed taking into account the actual operational context of Castello Beer Factory, with the aim of balancing methodological rigour and ease of use. Although the model is grounded in the principles of Activity-Based Costing (ABC), its structure has been adapted to the reality of a microenterprise that lacks both an Enterprise Resource Planning (ERP) system and a formal cost accounting framework. Consequently, the design prioritises an accessible, user-friendly, and replicable format that is compatible with the management capabilities of this type of organisation.

The model was developed using information provided by the company through structured data collection forms and exploratory meetings with members of the management team. This process enabled the development of a proposal that is methodologically consistent with the theoretical framework of the study while remaining closely aligned with the specific characteristics of the production process under analysis. The model was developed between 1 July 2025 and early January 2026.

The model has been designed for periodic use, preferably on a monthly basis, allowing continuous cost monitoring and facilitating comparisons across reporting periods. Furthermore, because it is implemented in Microsoft Excel, it offers sufficient flexibility to incorporate adjustments, improvements, and scenario simulations as the company's management needs evolve.

Beyond the methodological aspects associated with the design of the tool, the findings also provide broader insights into the organisational conditions under which an Activity-Based Costing system may be particularly suitable for small manufacturing firms. These theoretical implications are discussed in the following section.

6.2. Proposal Contextualisation

As a complement to the diagnosis carried out, a production data collection template developed in Excel was used, together with internal documentation provided by the company. This allowed the information obtained through the questionnaires to be expanded and refined, facilitating a more detailed understanding of the organisation's operational functioning. Based on these results, the feasibility of developing a simple cost management model adapted to the company's operational reality is confirmed.

The objective of the proposal is to improve the existing cost management system by strengthening those areas with a lower level of development and providing the company with a more precise and systematic operational tool. Rather than aiming to replace an ERP system or a formal accounting structure, the proposed model is conceived as a practical, low-cost solution with high managerial value, designed to facilitate cost analysis and support short-term operational decision-making.

In the case of Castello Beer Factory, the implementation of an Activity-Based Costing (ABC) model is proposed as a methodologically coherent alternative, consistent with the characteristics identified during the diagnostic phase. The choice of this system is grounded in the specific features of the company's production process. In particular, the existence of multiple production stages, the heterogeneous consumption of indirect resources, and the difficulty of allocating these costs using simple criteria make it necessary to adopt a model that allows for greater precision in cost allocation. These characteristics are consistent with the theoretical conditions that justify the applicability of ABC in smaller organisations with relatively complex production processes.

In the context of the company analysed, and more broadly within artisanal microbreweries, a differentiation strategy implies that each product presents specific characteristics in terms of production process, time requirements, input usage, and control needs. Unlike standardised production environments, this operational heterogeneity makes it difficult to apply simple allocation criteria for indirect costs.

The ABC approach allows indirect costs to be linked to the activities that generate them, providing greater traceability and detail in cost information, and enabling a more accurate understanding of the cost structure of each product. In this way, the proposal is presented as a coherent solution aligned with the observed operational complexity, the information needs identified in the diagnostic phase, and the objective of improving the quality of information available for decision-making.

The main scope of the proposal is presented below:

- To improve cost traceability by activity and product.
- To facilitate the analysis of margins by product line.
- To identify the impact of indirect costs and how each production activity affects unit costs.
- To enable practical simulations and assess the impact of operational decisions.
- To systematise the monthly monitoring of cost margins, generating comparable historical information.
- To serve as a basis for future automation or integration with more advanced systems.

6.3. General Description of the Proposed Model

The system is structured under the ABC approach and operationalised through a spreadsheet specifically designed for Castello Beer Factory. This approach enables a more precise allocation of indirect costs to products based on actual activity consumption, in line with the theoretical foundations of activity-based costing developed in the theoretical framework of this study. Figure 3 illustrates the activities defined within the model.

Figure 3. Illustration of the activities defined in the system

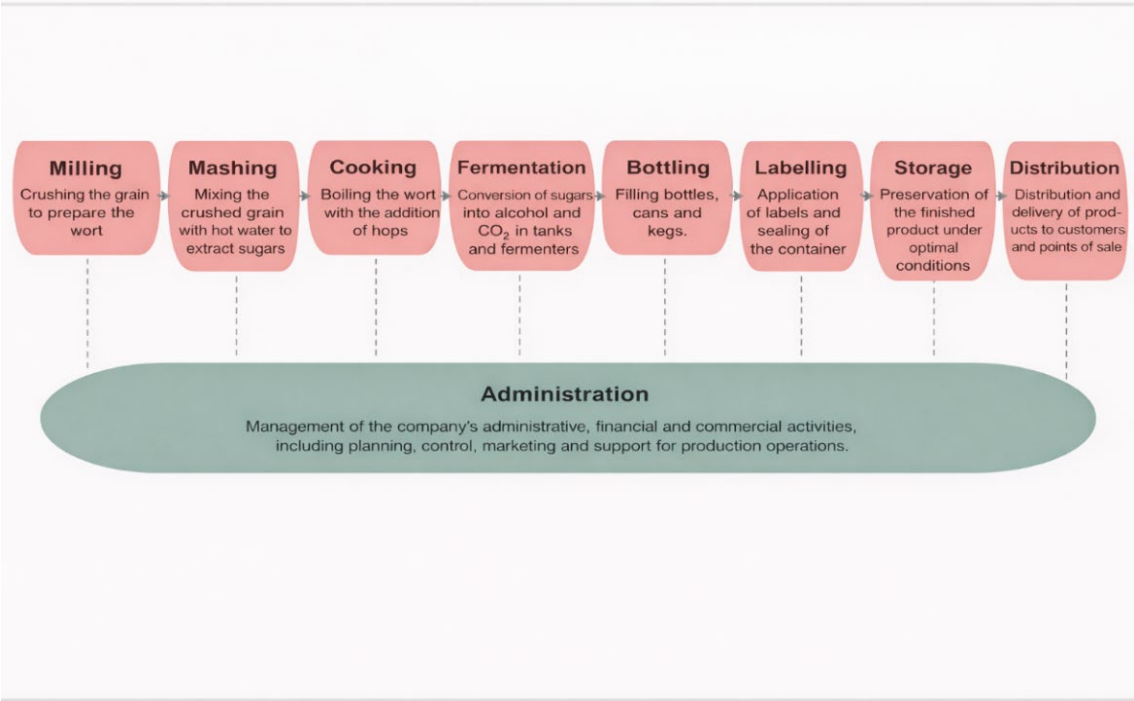
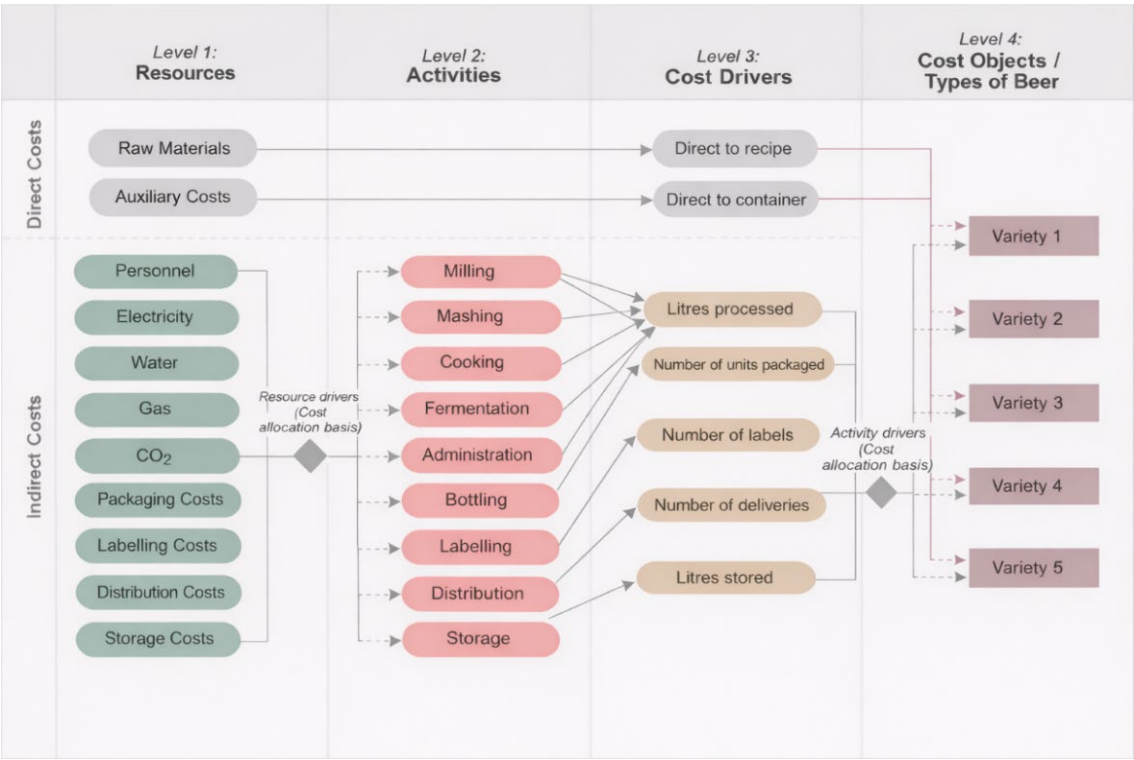


Figure 4 presents the overall functioning of the system and the ABC allocation logic applied to Castello Beer Factory.

Figure 4. Cost allocation flow under the ABC model



The figure summarises the logic of the proposed cost model. Once activities are defined, the system is organised through a hierarchical allocation structure characteristic of the

ABC approach. Initially, the company's resources are classified into direct and indirect costs, with direct costs assigned directly to cost objects according to their specific consumption.

Subsequently, indirect resources are allocated to the different production activities based on their relative consumption, using resource drivers that allow costs to be accumulated at the activity level. Each activity is then associated with a cost driver, which acts as the allocation criterion to assign accumulated activity costs to the different types of beer produced, according to their actual consumption of each activity.

6.4. Operational Structure of the Proposal

The system is composed of several interconnected Excel sheets, each fulfilling a specific role within the model's workflow. Some sheets are visible to the end user in daily use, while others remain hidden. The latter perform all underlying calculations and serve as a structural base for adjustments or operational revisions of the tool.

The following are the sheets visible to the user, representing the operational interface of the proposal.

6.4.1. User Interface

This is the main interaction sheet and serves as the monthly working environment. Its design has been optimised to be intuitive, visually clear, and easy to use, even for users without specialised accounting knowledge. The interface is intended for regular use by the management team, allowing data input and the immediate generation of key results.

It is structured into three main areas:

- Data input area

This section is designed so that the user only enters the strictly necessary information. Editable cells are clearly marked, while the rest are protected to prevent errors. Inputs include production volume by product, number of units, direct costs for the period, and other operational variables. This design allows any team member to complete the information quickly and without the risk of altering formulas.

- Product-level results area

This section automatically displays unit costs, selling prices, and margins per litre for each product. The information is updated in real time as data is entered and is presented in clear tables with values expressed in euros and percentages, facilitating analysis.

- Monthly summary area

This section provides a consolidated view of key monthly indicators, including total production volume, total costs (direct and indirect), sales value, total margins, and overall profitability. It functions as a dashboard for rapid performance evaluation.

At the bottom of the sheet, there is a button that activates a macro named "Save current month," which automatically transfers the data to the historical summary sheet and the charts sheet. This action can be repeated as needed, as each execution generates a new entry with the exact date and time, while removing duplicates to retain the most updated version. This enables precise chronological tracking of each monthly iteration or adjustment.

6.4.2. Historical Summary

This sheet automatically compiles and organises monthly results once the "Save current month" macro is executed. It records each iteration with date and time, allowing for longitudinal performance tracking. Its structure facilitates period comparisons and trend analysis in terms of profitability and efficiency.

6.4.3. Results Charts

This sheet provides automated visualisations based on the data consolidated in the historical summary. It allows for a clear and rapid analysis of key performance indicators over time and is designed to support decision-making through an intuitive visual approach.

6.4.4. Product Detail

This sheet presents a detailed breakdown of unit costs by product, distinguishing between direct costs and indirect costs allocated through ABC drivers.

It allows for the analysis of how each beer variety contributes to total costs and facilitates the identification of profitability differences between products, particularly at the level of each activity included in the model.

7. Discussion and Theoretical Contributions

7.1. Theoretical Contributions

Based on the analysis of an artisanal brewing microenterprise, this study shows how organisational development can progressively modify managerial information needs. The introduction of new products, the differentiation of production processes, the increasing proportion of indirect costs, and the need to assess the profitability of individual products reduce the ability of traditional cost allocation systems to accurately represent resource consumption. Under these conditions, an Activity-Based Costing (ABC) system becomes a more appropriate management tool.

From this perspective, the study provides evidence suggesting that the adoption of an ABC system should not be understood as a decision determined exclusively by organisational size, but rather by the level of operational complexity achieved and the evolution of the organisation's information needs. In this regard, the findings indicate that the relevance of a cost management system depends on the emergence of specific organisational conditions that create an increasing demand for more accurate, traceable, and disaggregated cost information to support managerial decision-making.

The literature on Activity-Based Costing has devoted considerable attention to the technical requirements for its implementation, such as the identification of activities, resources, cost drivers, and cost objects. From this perspective, the feasibility of the model is generally assessed according to an organisation's ability to develop and maintain this information structure. The findings of this study complement this perspective by suggesting that the key issue extends beyond the technical capability to implement an ABC system and instead lies in determining whether the organisation genuinely requires the information that such a system provides to support management. Consequently, the decision to adopt an ABC system should be based not only on the feasibility of its implementation, but also on the need to gain a more accurate understanding of how activities consume resources and how this resource consumption affects the profitability of products and processes.

In this regard, the findings suggest that organisational development constitutes the mechanism through which managerial information needs are progressively transformed. As operational complexity increases, organisations require cost management systems capable of representing resource consumption more faithfully and improving cost

traceability. From this perspective, the adoption of an ABC system can be understood as a response to the evolution of information needs arising from organisational development, rather than as an automatic consequence of organisational growth or production volume.

In addition to this theoretical contribution, the study also provides a methodological contribution by developing a proposal that adapts the principles of Activity-Based Costing to a manufacturing microenterprise through a low-cost and user-friendly management tool. This adaptation demonstrates that the conceptual foundations of management accounting can be effectively transferred to organisations that lack Enterprise Resource Planning (ERP) systems and formal cost accounting structures while still providing a sufficient level of detail to support managerial decision-making without introducing unnecessary technical complexity.

Overall, these findings contribute to the management accounting literature by extending the discussion on the adoption of Activity-Based Costing systems, proposing that their relevance should be analysed from the perspective of the evolution of managerial information needs resulting from increasing organisational complexity, rather than being assessed solely on the basis of organisational size or production volume. Taken together, the findings provide a conceptual foundation that may guide future research on the adoption of Activity-Based Costing systems in small manufacturing firms and other productive contexts with similar organisational characteristics.

7.2. Practical and Managerial Implications

From a managerial perspective, the findings of this study indicate that increasing operational complexity requires management tools capable of transforming available data into meaningful information for decision-making. In this context, structuring cost information plays a fundamental role in improving the understanding of organisational performance and strengthening management processes. In line with García Osma, Gómez-Conde, and López-Valeiras (2022), the availability of more systematic, relevant, and management-oriented information may contribute to improving decision quality and, ultimately, organisational performance.

As widely recognised in the Activity-Based Costing (ABC) literature, the application of an ABC system enables organisations to understand more accurately how different activities consume resources and how indirect costs affect the profitability of individual products. However, this information becomes particularly relevant in small

manufacturing firms, where relatively small variations in production costs, resource utilisation, or product portfolio composition may significantly affect both profit margins and the organisation's ability to sustain its competitiveness over time. From this perspective, an ABC system provides a more robust analytical basis for reviewing pricing policies, evaluating production processes, and allocating resources according to the economic contribution of each activity and product.

The main practical value of an ABC system in microenterprises does not lie solely in improving the accuracy of product cost calculations, but in providing the information required to identify the economic variables that determine business profitability. As noted by Kuster (2021), understanding these variables constitutes a key element for the management and economic viability of craft microbreweries. In this regard, the findings of the present study suggest that an ABC system becomes particularly valuable in microenterprises whose growth is accompanied by increasing operational complexity, characterised by the introduction of new products, the diversification of activities, the differentiation of production processes, and a growing proportion of indirect costs. Under these conditions, having access to information that explains how activities consume resources and how such resource consumption influences profitability provides a stronger basis for management and may contribute to strengthening the long-term economic sustainability of the organisation.

7.3. Study Limitations

The findings of this study provide applied evidence on the organisational conditions under which an Activity-Based Costing (ABC) system may become appropriate in an artisanal manufacturing microenterprise, as well as on the design of a methodological proposal adapted to that context. Nevertheless, the scope of these findings should be interpreted in light of the characteristics of the research design and the information available for the development of the proposed model.

First, the study is based on the analysis of a single case, which enabled an in-depth diagnosis of the company's cost management system and the development of a proposal tailored to its operational reality. Consequently, the findings should be understood as applied evidence derived from a specific organisational context, whose value lies in identifying organisational conditions that may be transferable to firms with similar characteristics rather than in providing statistically generalisable conclusions.

Second, the proposed model was developed using the information made available by the company. Although relevant data were obtained regarding raw materials, auxiliary inputs, production, and certain indirect costs, part of this information was not sufficiently systematised or disaggregated to identify resource consumption at the activity level directly. Consequently, the construction of the model required the use of assumptions and allocation criteria consistent with the available information, which may be refined as the company develops more detailed operational records.

Finally, although this study suggests that certain organisational conditions may justify the suitability of an ABC system in small manufacturing firms, this interpretation is derived from the analysis of a single case and from a proposal that has not yet been implemented under actual operating conditions. Consequently, both the practical usefulness of the proposed model and the validity of the organisational conditions identified in this study should be examined through future research that evaluates the implementation of the model in real operating environments and explores whether these conditions are also observed in other small manufacturing firms with similar organisational characteristics.

Conclusions

This study highlights the relevance of strategic cost management as a key element for improving operational efficiency and contributing to organisational performance. The literature recognises that cost management systems are not merely accounting tools for recording transactions, but essential mechanisms for understanding resource consumption, identifying inefficiencies, and generating information that supports managerial decision-making. In this sense, the quality of cost information directly influences organisations' ability to respond to increasing operational complexity and sustain their long-term competitiveness.

The analysis of Castello Beer Factory reveals a growing gap between the operational complexity achieved by the company and the capacity of its cost management system to provide useful information for decision-making. This limitation reflects the difficulty of the current system in organising and transforming the available information into structured, reliable, and management-oriented data. Likewise, the diagnosis suggests that the existing system is adequate for day-to-day operational control but presents limitations in supporting decisions related to profitability analysis, pricing, and resource allocation.

Taken together, these findings provide an affirmative answer to the research question by indicating that the current system does not provide sufficiently structured information to support decision-making in a context of increasing operational complexity.

Based on these findings, the study develops an Activity-Based Costing (ABC) proposal adapted to the operational characteristics of the analysed company. Rather than presenting ABC as a universal solution for small firms, the study illustrates how this approach can be adapted to organisations in which the evolution of their operations generates information requirements that exceed the capabilities of traditional cost allocation systems.

One of the main findings of this research is that the relevance of adopting an Activity-Based Costing system is not determined by organisational size, but by the level of operational complexity and the need for more traceable, accurate, and disaggregated cost information. The coexistence of multiple products, differentiated production processes, an increasing proportion of indirect costs, and the need to analyse product profitability constitute a set of organisational conditions under which an ABC system becomes particularly appropriate.

From this perspective, the study contributes to the management accounting literature by providing applied evidence on the organisational conditions that favour the adoption of Activity-Based Costing systems in small manufacturing firms. Beyond the technical design of a cost model, the findings demonstrate how organisational development transforms information requirements and increases the importance of adopting more structured cost management systems capable of effectively supporting managerial decision-making.

Finally, the findings of this study open new opportunities for future research. The implementation and longitudinal evaluation of the proposed approach would allow researchers to assess its effects on the quality of management information, decision-making processes, and organisational performance. Likewise, applying this approach to other manufacturing microenterprises would contribute to evaluating the transferability of the findings and to further advancing knowledge on the adoption of Activity-Based Costing systems in similar organisational contexts

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AUTHOR CONTRIBUTIONS

The author was responsible for the conceptualization of the study, methodological design, data collection and analysis, development of the proposed costing system, preparation of the manuscript, and final revision.

CONFLICTS OF INTEREST

The author declares no conflict of interest related to this study.

USE OF ARTIFICIAL INTELLIGENCE (AI)

AI tools were used to support language editing, proofreading, and improvement of the writing. The author reviewed and validated the final content and remains fully responsible for the accuracy, interpretation, and final version of the manuscript.

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