

Challenges in Applying Full Costing Systems to Cost Management According to Companies' Production Regimes

Paulo Deco, Abiniel Macaia Conde Gomes

Faculty of Economics, 11 de Novembro University, Cabinda, Angola

Email: deco.rosa77@gmail.com, paulodeco2009@hotmail.com, abinielgomes9@gmail.com

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Abstract

This study examines the challenges associated with applying the full costing system—also known as absorption costing—in companies operating under different production regimes, with the aim of analyzing the impact of this method on cost measurement and control. The research is based on the practical implementation of this system in two companies with distinct operational models: one adopts a job order (discontinuous) production regime, while the other operates under a continuous (mass production) regime. The findings reveal that in continuous production environments, consideration of work-in-process (both beginning and ending inventories) is essential for accurate cost measurement, as the existence of intermediate inventories directly affects cost structure and product pricing. In contrast, for companies operating under a job order system, this variable becomes irrelevant since production is demand-driven, eliminating the need for intermediate inventories and thus affecting the allocation of costs. Methodologically, the study employs a qualitative-quantitative approach, grounded in a literature review and documentary analysis of accounting and operational data from the companies analyzed. Comparing the two production regimes reveals that indiscriminate application of full costing, without proper adaptation to the production model, can lead to distortions in cost analysis and, consequently, misinformed managerial decisions. Thus, the study underscores the need for a differentiated approach when implementing this method to ensure the reliability of accounting information and the efficiency of cost management.

Keywords

Challenges, Full Costing System, Production Regime, Cost Management,

1. Introduction

The management of organizations and companies has always necessitated a scientific field devoted exclusively to the recording of all accounting events that, due to their nature, alter an entity's assets—what is conventionally known as accounting. With the intensification of industrial processes and the growing complexity of production models, it became necessary to develop an accounting approach that also accounted for internal organizational activities, giving rise to cost and management accounting.

Following World War II, the acceleration of industrialization and the rising demand for goods and services created a need for more accurate methods for cost measurement. This scenario led to the development of various costing systems, tailored to the specificities of production processes and designed to provide strategic management information. Currently, these systems are classified into traditional and modern categories. Among the traditional methods are full costing (absorption costing), variable costing, fixed cost allocation (rational imputation), and standard costing. More modern approaches, such as Activity-Based Costing (ABC), were developed to enhance cost allocation by adopting more detailed and operationally aligned criteria.

This study focuses on the full costing system, widely used in managerial accounting due to its alignment with International Financial Reporting Standards (IFRS). However, the specialized literature seldom explores the distinctions in applying this system according to a company's production regime. Firms operating under a continuous regime present characteristics significantly different from those operating under a job-order (discontinuous) regime, which directly impacts cost allocation and control. A lack of careful adaptation of this method can lead to distortions in accounting analysis and compromise the accuracy of management information.

Accordingly, this study aims to analyze the application of the full costing system under different production regimes by presenting and solving practical exercises. The comparison between continuous and job-order production models will highlight the nuances of the full costing system, contributing to better alignment between management accounting and organizations' strategic needs. The research adopts a qualitative-quantitative methodology, combining literature review and document analysis to support both theoretical discussion and practical application.

Through this investigation, the authors aim to provide accounting professionals and managers with insights to improve the use of full costing, ensuring that its implementation accurately reflects the company's production structure. The study is especially relevant in its goal to optimize cost measurement and minimize distortions that may impair decision-making and financial sustainability.

2. Challenges in the Application of Full Costing

According to [Horngren, Bhimani, Datar & Foster \(2002\)](#), the full costing system is a traditional cost appropriation method that incorporates both fixed and variable costs into the valuation of a company's products or services. This method is widely adopted due to its compliance with International Accounting Standards and Financial Reporting guidelines. However, the accounting literature exhibits a significant theoretical gap by failing to consider the specific characteristics of different production regimes when applying this system.

As stated by [Guerrero, Priego, Cebrián & Palácios \(2009\)](#), indiscriminate adoption of this costing method—without adapting it to the company's production model—can lead to distortions in cost allocation and ultimately compromise the accuracy of accounting information used in managerial decision-making.

In this context, analyzing the impact of production regimes on the application of full costing becomes imperative. Organizations can be broadly categorized into two types based on their production regime:

- ❖ **Companies operating under a continuous production regime:** These are characterized by an uninterrupted production flow, which requires management to maintain inventories of raw materials, work-in-progress, and finished goods.
- ❖ **Companies operating under a job-order (discontinuous) regime:** These produce goods based on demand, without maintaining intermediate inventories, as production is carried out according to customer orders.

The distinction between these production regimes necessitates consideration of work-in-progress inventories in continuous production systems. Costs incurred at various stages of the production cycle directly affect the overall cost structure and, consequently, the product pricing. According to [Ferreira, Caldeira, Asseiceiro, Vieira & Vicente \(2019\)](#), examples of companies following this model include those in the manufacturing, oil extraction, baking, cement production, aviation, healthcare, and education sectors.

Conversely, as noted by [Caiado \(2011\)](#), companies operating under a job-order regime—such as tailor shops, carpentry workshops, and metalworking firms—produce exclusively based on customer demand. This eliminates the need for intermediate inventories and simplifies cost allocation. In this configuration, applying full costing without methodological adjustments may overstate unit costs, resulting in misguided decisions regarding pricing strategies and competitive positioning.

Therefore, when applying the full costing system, it is essential to consider this factor. Failing to do so may bias cost analysis, leading to the calculation of unreal or inaccurate costs and results that do not reflect the company's operational reality.

It is within this context that the present study is situated—highlighting the practical differences in applying the full costing system and aiming to determine the most accurate cost measurements possible based on each company's production

regime.

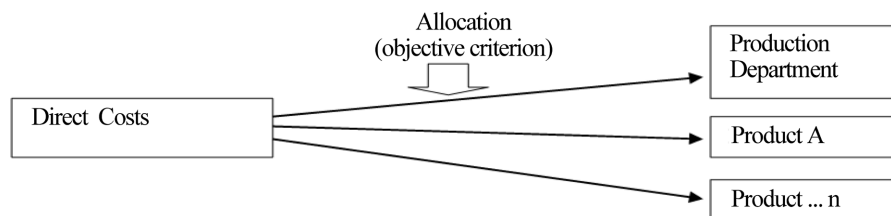
3. Conceptual Framework

This section presents the theoretical foundation of the full costing or absorption costing system, highlighting its fundamental stages. The process begins with the allocation of direct and indirect costs and culminates in determining the analytical result of the manufactured products, taking into account the production regime adopted by the company.

The cost management literature presents various approaches to traditional costing systems. However, authors such as Mendes (1996), Horngren et al. (2002), Ripoll & Balada (2003), Guerrero et al. (2009), Caiado (2011), Tapa (2013), Franco et al. (2015), Nabais & Nabais (2016) and Ferreira et al. (2019) do not delve deeply into the specificities of production regimes when applying absorption costing. This theoretical gap highlights the need for a more detailed analysis of how the production regime influences cost determination, particularly regarding accurate measurement of business results in different operational contexts.

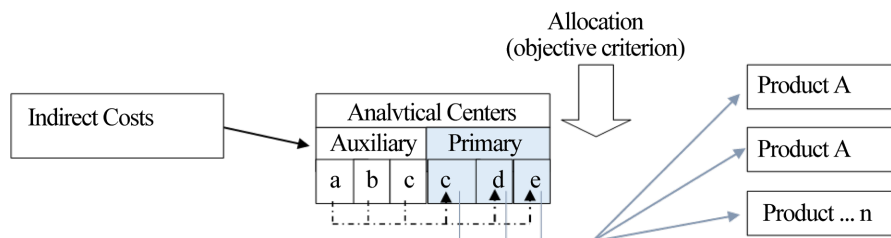
3.1. Allocation of Direct and Indirect Costs

Direct costs, prior to being assigned to the company's products, are first directed toward the appropriate department and then allocated to the products. For example, when allocating the cost of raw materials, the quantity consumed by each product is taken into account (Figure 1).



Source: Guerrero et al. (2009).

Figure 1. Allocation of direct costs to departments and products.



Source: Guerrero et al. (2009).

Figure 2. Allocation of indirect costs across cost centers.

With respect to indirect costs, Horngren et al. (2002), identifies three different methods for their allocation: the coefficient allocation method, the homogeneous

sections or cost center method, and the Activity-Based Costing (ABC) method .

The chosen method in this study is the **homogeneous sections method**, which is based on breaking down the organizational structure into basic units, referred to as cost centers, responsibility centers, departments, or sections (**Figure 2**).

3.2. Full Costing System and Its Components

The full costing system involves the appropriation of all production-related costs, encompassing both fixed and variable expenses. This method accounts for the total expenses incurred by the company from the acquisition of raw materials through to the commercialization of finished goods. Costs are then proportionally allocated to the volume sold, thereby offering a comprehensive assessment of the cost structure and providing essential input for financial management and pricing strategies.

According to **Deco & Gomes (2024)**, when a company begins its operations or works based on customer orders (job order production), concepts such as beginning and ending work-in-process inventories or stock levels are not factored into the calculation of the total cost of finished goods. This is because production is executed upon demand, eliminating the need to maintain intermediary inventories.

Therefore, in demand-driven companies, such as those operating under a job-order production system—the calculation of production costs does not account for **IWIPC**, **FWIPC**, or inventory balances (initial or final). This is because production is executed according to the specific requirements of individual customers, eliminating the need for intermediary inventories or pre-produced finished goods (**Figure 3**).

	CRMC	+DLC	+GMO	
	Production Cost (PC)			
	=			
	Finished Product Cost (FPC)			+Custo de Distribuicao
Sales Revenue	- Full or Total Cos (FC)			
Analytical Result (AR)				

Source: Inspired of **Caiado (2011)**. **Note:** In companies that produce based on job orders, both the Beginning and Ending Work-in-Process Costs are non-existent. The Ending Work-in-Process Cost is not included because it is not considered an additional component in calculating the cost of finished products for the period.

Figure 3. Full or total cost under a job-order or discontinuous production regime.

For well-established companies that produce standardized products in a continuous flow, the total cost of finished goods must include beginning work-in-process and exclude ending work-in-process. This ensures the accurate attribu-

tion of costs throughout the production cycle and enhances the precision of unit cost calculations.

Thus, Deco & Gomes (2024) assert that before applying the full costing method, it is crucial to identify the company’s production regime—whether series production or job order. In continuous production environments, the costs of work-in-process must be recorded from the outset to ensure proper measurement of the total cost of finished goods.

From this distinction arise two essential concepts in business cost analysis at the close of an accounting period: **Cost of Production for the Period (CP)** and **Cost of Finished Goods for the Period (CPF)**. These concepts are vital to ensure the reliability of accounting information, enabling efficient management of production resources and more accurate operational and financial strategies.

The total of industrial or production costs—including those incurred in the sale and distribution of products, plus non-manufacturing costs—constitutes what is known as **Full or Total Cost**. This feeds into the calculation of the **Analytical Result**, and with the deduction of taxes and fiscal charges, leads to the determination of **Net Income**, from a financial accounting perspective.

According to Deco & Gomes (2024), for companies engaged in mass or series production, the full costing method considers that the **Cost of Production (CP)**—essential for the accurate determination of the **Finished Product Cost (CPPA)** stored in inventory—comprises the following elements: **Initial Work-in-Process Costs (IWIPC)**, **Cost of Raw Materials Consumed (CRMC)**, **Direct Labor Costs (DLC)**, and **General Manufacturing Overheads (GMO)**, which include both variable and fixed costs. In addition, the **Final Work-in-Process Costs (FWIPC)** are deducted to ensure that cost measurement accurately reflects the productive reality of the company (Figure 4).

Therefore:

- $Product\ Cost = CRMC + DLC + GMO$ (fixed and variable)
- $Finished\ Products\ Cost = IWIPC + CRMC + DLC + GMO$ (fixed and variable)
- $Period\ Cost\ or\ Commercial\ Cost = CFSP + Distribution\ Cost + Financial\ Costs$

		CRMC	+DLC	+GMO		
		+IWIPC		+ Production Cost (CP)		-FWIPC
	+BIC	+Finished Product Cost (FPC)				-EIC
	+Costs of Finished and Sold Product (CFSP)					+Distribution Cost
Sales Revenue	-Full or Total Cost (FC)					
Analytical Result (AR)						

Source: Inspired of Caiado (2011).

Figure 4. Full or total cost under a mass production regime.

Where:

CRMC—Cost of Raw Materials Consumed

DLC—Direct Labor Costs

GMO—General Manufacturing Overheads

IWIPC—Initial Work-in-Process Costs

FWIPC—Final Work-in-Process Costs

BIC—Beginning Inventory Cost

EIC—Ending Inventory Cost

All other expenses are classified as **period costs**, including those related to the commercialization of products, such as **Distribution Costs** and other charges necessary to facilitate sales. These expenses are technically defined as **costs associated with finished products sold (FPSC)** and are not directly incorporated into production costs, but instead are considered in the determination of the **accounting period's result**, valid information for both companies that operate in series and those that are made to order.

Stages for Determining Full Cost and Analytical Result

According in line with the framework proposed by Deco & Gomes (2024), and considering the various stages of a company's production chain – from the acquisition of raw materials to the commercialization of the final product – the determination of **Full Cost** involves the following sequential stages:

1st Stage – Allocation of Indirect Costs: application of the **homogeneous sections method** to allocate indirect costs to the appropriate cost centers.

2nd Stage – Determination of the Production Cost (CP): this consists of calculating the total direct and indirect costs incurred in manufacturing the products.

3rd Stage – Determination of the Finished Production Cost for the Period (FPC): this stage applies specifically to companies operating under continuous or mass production regimes, and it takes into account both beginning and ending work-in-process inventories.

4th Stage – Determination of the Finished and Sold Products Cost (FSPC): at this point, the calculation focuses on the cost of products actually sold during the accounting period.

5th Stage – Determination of Distribution Costs (DC): this includes all costs related to logistics, transportation, and other expenses associated with placing the product on the market.

6th Stage – Determination of the Full or Total Cost (FC): this step sums all production and distribution costs, as well as other relevant business-related expenses.

7th Stage – Determination of the Analytical Result (AR): this final step calculates the company's economic result for the period, based on the difference between revenues and all costs incurred.

4. Applied Methodology

To carry out this investigation, bibliographic and descriptive research methods

were employed. The former enabled consultation of several pioneering authors in the field of cost management, specifically regarding the use of the full or absorption costing system, as outlined in the conceptual framework. The latter made it possible to characterize and diagnose the companies under study. According to [Marconi and Lakatos \(2002\)](#), bibliographic research is a fundamental methodological procedure for theoretically grounding a study, enabling the critical analysis of established concepts and approaches.

The research adopts a qualitative approach which, according to [Gil \(2019\)](#), enables a deeper understanding of the dynamics of organizational processes, regardless of whether the results were quantified using tables and inventories. Data collection in the field was conducted through the technique of document analysis, as outlined by [Bardin \(2016\)](#) and [Deco \(2024\)](#). This method allowed for the extraction of data from documents such as payroll sheets, annual reports and accounts, purchasing records, and material requisition forms of the companies under study, in order to account for direct and indirect costs incurred during the period under review. In addition, the results obtained were interpreted with the aim of providing a detailed assessment of the application of the absorption costing method. In this context, quantitative elements were used solely for measuring the different types of costs, revenues, and results presented in the tables and inventories, which were essential for the cost management analysis.

The application of full costing in both companies was based on the collection of data specific to each organization, as presented in the section “presentation and discussion of results.” These data are considered primary, as they were obtained directly from internal documents of the entities under investigation.

The main contribution of this study lies in the **critical review of classical approaches** to the full costing system. Traditionally, this system was designed to be applied uniformly across all companies, regardless of their production regime. However, this approach overlooks the specificities of different operational models, which may compromise the accuracy of analytical cost.

The analysis carried out in this research highlights that **companies with continuous production processes** operate under a model that requires uninterrupted work shifts to ensure a steady production flow. This production model entails the existence of products in various stages of completion, which directly influences the costing process. It is therefore necessary to consider the **work-in-process inventory (both beginning and ending)**, as the transition between shifts affects the overall cost structure. This characteristic ensures the continuous availability of finished products and services for commercialization, making it a key factor for achieving accurate cost measurement within the full costing framework.

5. Presentation and Discussion of Results

This section initially presents the results obtained from **Alfaiataria Uenda Uiza**, a company operating under a **job-order production regime**. Following this, the findings from **Panificadora Simba**, a company engaged in **continuous or series**

production, are discussed. This structure facilitates a comparative analysis of the practical implementation of the absorption costing system under two distinct production environments.

5.1. Case Study: Alfaiataria Uenda Uiza

At this point, the research data from Alfaiataria Uenda Uiza and the results achieved as a result of the application of full costing are presented, as well as the discussion of the respective results.

5.1.1. Presentation of Tailoring Data

Alfaiataria Uenda Uiza is an industrial enterprise specializing in the manufacture of three main products: **shirts, trousers, and blouses**. The company uses three primary raw materials: **fabric, buttons, and thread**.

Its workforce consists of 30 employees, including:

- 1 General Director earning 200,000 Kz
- 1 Deputy Director for Administration and Finance earning 190,000 Kz
- 1 Deputy Director for Production earning 195,000 Kz
- 1 Security Assistant earning 50,000 Kz
- 1 Cleaning Assistant earning 45,000 Kz
- 25 Tailors paid at 200 Kz/hour, working 22 days/month and 8 hours/day

During the period analyzed, the company made the following **raw material purchases**:

- Fabric: 10,000 meters at 20 Kz/meter
- Thread: 9000 small spools at 5 Kz/spool
- Buttons: 10,000 boxes at 8 Kz; 20,000 boxes at 5 Kz
- Additional Thread: 10,000 small spools at 4 Kz
- Additional Fabric: 3000 meters at 10 Kz

Note: raw materials will be directly affected in production according to the products produced, observing the guidance in “(Figure 1)”.

Subsidiary Material (interlining): 8,000 meters at 6 Kz

Production Volume during the period:

- Shirts: 100,000 units
- Trousers: 50,000 units
- Blouses: 120,000 units

Selling Prices: Shirts: 30 Kz/unit; Trousers: 60 Kz/unit and Blouses: 80 Kz/unit

Costing Method Adopted: Weighted Average Cost (CUMP – *Custo Médio Ponderado*)

Allocation Basis for Indirect Costs:

Indirect expenses were allocated according to a cost center map, according “(Figure 2)”.

The allocation of materials was defined according to the following criteria:

- ✓ Fabric: allocated proportionally based on the number of units produced;
- ✓ Buttons: distributed according to usage ratios, as follows: ¼ allocated to shirts, 2/4 allocated to trousers, and the remaining ¼ allocated to blouses;

✓ Thread: allocated in direct proportion to the quantity of units produced.

Direct labor costs (MOD) were apportioned according to the proportional consumption of buttons across the different product categories.

The primary objectives of this cost analysis are:

- ✓ To determine the detailed cost structure for each product by applying the full absorption costing methodology, thereby enabling a comprehensive allocation of direct and indirect costs;
- ✓ To generate financial statements that accurately represent the actual production conditions, ensuring consistency with the principles of cost accounting and the observed operational realities.

Note: The exchange rate between the currency kwanza and dollar: 1usd is equal to 1.000 kz.

5.1.2. Resolution and Discussion of the Results of the Uenda Uiza Tailoring

1st Stage: Allocation of Indirect Costs Using the Homogeneous Sections Method Initially, the values of indirect costs and the number of work units for the main cost centers are calculated, considering the nature of work associated with each center.

Direct Labor Cost

Table 1. Distribution of indirect costs incurred map.

Elements	Auxiliary Centers		Main Centers		
	Administration	Maintenance	Procurement	Manufacturing	Distribution
Personal Expenses	10%	20%	10%	30%	30%
Secondary Material				100%	
Administration	?	20%	20%	40%	20%
Maintenance	30%	?	30%	20%	20%
Nature of Work Unit	Meter of Row Material Consumed		Direct Labor Hours	25kz per sale	

Table 2. Indirect labor map (ILC).

Description	Quantity	Unit Cost (kz)	Total Cost (kz)
General Director (DG)	1	200,000.00	200,000.00
Deputy Director (D. D)	1	190,000.00	190,000.00
Physical Protection	1	50,000.00	50,000.00
Cleaning Assistant	1	45,000.00	45,000.00
Total	4		485,000.00
ILC			485,000.00 (Indirect Labor Cost)

According to the distribution keys collected in the field “(Table 1)”, indirect labor corresponds to the salary of administrative workers including the salary of sales staff, “as can be seen in Table 2”, corresponding to 485,000.00. It is an indi-

rect cost subject to subsequent distribution in the indirect costs distribution map according to the distribution keys contained in each center that makes up the company.

$$\text{Deputy Director of Production Salary} = 195,000.00\text{kz}$$

$$\begin{aligned} \text{Total salaries of workers} &= (25\text{Tailors}) * (200\text{kz}/\text{hour}) \\ &\quad * (8\text{hours}/\text{day}) * (22\text{days}/\text{month}) \\ &= 880,000.00\text{kz} \end{aligned}$$

Thus,

$$\text{Total Direct Labor Cost (DLC)} = 195,000.00 + 880,000.00 = 1,075,000.00\text{kz}$$

Calculation of the Number of Work Units (N° WU) for the Main Cost Centers

The direct labor corresponds to the salary of specialists or workers. According to the collected data, out of 25 tailors, the company pays a monthly salary of 1,075,000.00 to the tailors, taking into account the product of the number of tailors, the cost per hour worked, the number of hours worked per day, and the number of days worked per month, more Director of production salary 195.000 kz.

Raw Materials: Fabric, Buttons, and Thread (Weighted Average Cost Method—WAC).

Table 3. Raw material inventory: fabric, Method: WAC.

Purchase	Quantity (Meters)	Unit Cost (kz)	Total Cost (Kz)		Quantity (Meters)	Weighted Average Unit Cost (Kz)	Total Output Cost (Kz)
P1	10,000	20.00	200,000.00				
P2	3000	10.00	30,000.00				
	13,000		230,000.00	Output	13,000	17.692	230,000.00

Table 4. Raw material inventory: buttons, Method: WAC.

Purchase	Quantity (Boxes)	Unit Cost (Kz)	Total Cost (Kz)		Quantity (Boxes)	Weighted Average Unit Cost (Kz)	Total Output Cost (Kz)
P1	10,000	8.00	80,000.00				
P2	20,000	5.00	100,000.00				
	30,000		180,000.00	Output	30,000	6.00	180,000.00

Table 5. Raw material inventory: threads, Method: WAC.

Purchase	Quantity (Rolls)	Unit Cost (Kz)	Total Cost (Kz)	Output	Quantity (Rolls)	Weighted Average Unit Cost (Kz)	Total Output Cost (Kz)
P1	9,000	5.00	45,000.00				
P2	10,000	4.00	40,000.00				
	19,000		85,000.00	Output	19,000	4.473	85,000.00

It is necessary to know the quantities of raw materials consumed in the production of 100,000 shirts, 50,000 pants, and 120,000 blouses. Therefore, in the “(Tables 3-5)” one can see the quantities of raw materials consumed in each. It was consumed 13,000 meters of fabric “(Table 3)”, 30,000 boxes of buttons “(Table 4)”, and 19,000 rolls “(Table 5)” in the production of 370,000 units.

Calculation of Work Units (WU)

- Procurement Center

The Number of Work Units for the Procurement Center – is the sum of all materials handled:

$$\begin{aligned} N^{\circ}WU(\text{Procurement Center}) &= 13,000\text{Mets} + 30,000Cx + 19,000Rl \\ &= 62,000\text{Mets} \end{aligned}$$

- Manufacturing Center

The number of work units for the Manufacturing Center corresponds to the total of hours dedicated by the tailors to transform fabrics, buttons and threads into shirts, trousers and blouses. Thus, it is calculated by multiplying the number of tailors by the number of working hours per day and the number of working days per month.

$$\begin{aligned} N^{\circ}WU(\text{Manufacturing Center}) &= (25\text{Tailors}) * (8\text{hours/day}) * (22\text{days/month}) \\ &= 4,400\text{hours} \end{aligned}$$

- Distribution Center (10 kz/sale)

The number of work units for the Distribution Center is determined by dividing the total sales value by the unit value defined for the work nature (10 kz per sale). Therefore, it requires the calculation of the total sales value.

Table 6. Sales volume map.

Product	Quantity Sold	Unit Selling Price (Kz)	Total Sales Value (Kz)
Shirts	100,000	30.00	3,000,000.00
Trousers	50,000	60.00	3,000,000.00
Blouses	120,000	80.00	9,600,000.00
Total	370,000		15,600,000.00

The tailoring reached a turnover valued at 15,600,000 kz from the sale of 100,000.00 shirts, 50,000.00 pants, and 120,000.00 blouses “as can be seen in Table 6”, taking into account the selling price of each product, mostly: 30 kz; 60 kz and 80 kz.

$$N^{\circ}WU(\text{Distribution}) = 15,600,000/25 = 624,000kz$$

$$\text{Subsidiary Material Cost} = 8,000\text{Mets} \times 6kz = 48,000.00kz$$

After determining the indirect costs associated with the tailoring operation—including indirect labor (ILC) and other overhead expenses—and calculating the work unit bases for the main production centers, the first and second allocations are carried out using the defined allocation keys for the tailoring workshop “as

shown **Table 1**” regarding the distribution keys.

In the second allocation, the value of the auxiliary centers to be redistributed is derived from the total obtained in the first allocation, plus the percentage received from reciprocal services rendered by other auxiliary centers. This mutual service provision between the two auxiliary centers results in a system of simultaneous equations, characteristic of the reciprocal method of cost allocation, according the distribution keys “as shown **Table 1**”.

$$\begin{cases} Adm = 48,500 + 30\% Man & Adm = 48,500 + 0.3Man \\ Main = 97,000 + 20\% Adm & Main = 97,000 + 0.2Adm \end{cases} \leftrightarrow$$

Inserting the second equation into the first:

$$Adm = 48,500 + 0.3 * (97,000 + 0.2Adm)$$

$$Adm = 48,500 + 29,100 + 0.06Adm$$

$$Adm - 0.06Adm = 77,600$$

$$0.94Adm = 77,600$$

$$Adm = \frac{77,600}{0.94} \quad Adm = 82,553.191kz$$

Inserting the value of Adm into the second equation, ...

$$Main = 97,000 + 0.2 * (82553.191)$$

$$Main = 97,000 + 16510.638$$

$$Main = 113510.638kz$$

Table 7. Indirect costs allocation map.

Elements	Total	Auxiliary Centers		Main Centers		
		Administration	Maintenance	Procurement	Manufacturing	Distribution
Personal Expenses	485,000.00	48,500.00	97,000.00	48,500.00	145,500.00	145,500.00
Secondary Material	48,000.00	-	-	-	48,000.00	-
Total from the First Allocation	533,000.00	48,500.00	97,000.00	48,500.00	193,500.00	145,500.00
Administration		(82,553.191)	16,510.6382	16,510.6382	33,021.2764	16,510.6382
Maintenance		34,053.1914	(113,510.638)	34,053.1914	22,702.1276	22,702.1276
Total from the Second Allocation	1,250,000.00	-	-	99,063.829	249,223.552	184,712.7658
Nature of Work Unit				Meter of Row Material Consumed	Direct Labor Hours	25 kz per sale
Nº WU				62,000	4400	624,000
Work Unit Cost				1.597	56.641	0.296

According to what can be observed in “(**Table 7**),” the allocation of indirect

costs was carried out based on the data collected in “(Table 1).” Thus, we have the total indirect costs of each main center, since the costs of the auxiliary centers are transferred to the main centers, applying the algebraic method in forming the system of equations to calculate the value of each received auxiliary center, considering the reciprocal keys between the centers.

Therefore, the costs of the Supply Center 99,063.829 kz; the Factory 249,223.552 kz and the Distribution center 184,712.7658 kz will be transferred to the production cost map for their allocation to the cost of the products produced (shirts, pants, and blouses), based on the unit costs of each main center: Supply 1.597 kz, 56.641 kz and Distribution 0.296 kz, respectively (Table 7). As can be seen below, the auxiliary calculations are in the 2nd stage.

Step 2: Determination of Production Cost (PC = Direct Production Costs + Indirect Production Costs)

Direct Production Costs (DPC)

The allocation of direct production costs, based on the number of units produced, is calculated using the following formula:

$$\frac{(\text{Cost or Quantity to be Allocated}) * (\text{Units Produced of the Product})}{\text{Total Units Produced}}$$

Fabric (allocated according to units produced)

Quantity:

$$\text{Shirts} = \frac{(13,000) * 100,000}{270,000} = 4,814.815 \text{units}$$

$$\text{Trousers} = \frac{(13,000) * 50,000}{270,000} = 2,407.407 \text{units}$$

$$\text{Blouses} = \frac{(13,000) * 120,000}{270,000} = 5,777.778 \text{units}$$

Value:

$$\text{Shirts} = \frac{(230,000) * 100,000}{270,000} = 85,185.19 \text{Kz}$$

$$\text{Trousers} = \frac{(230,000) * 50,000}{270,000} = 42,592.59 \text{Kz}$$

$$\text{Blouses} = \frac{(230,000) * 120,000}{270,000} = 102,222.22 \text{Kz}$$

Buttons ($\frac{1}{4}$ for shirts, $\frac{2}{4}$ for trousers, $\frac{1}{4}$ for blouses)

Quantity:

$$\text{Shirts} = (30,000) * \frac{1}{4} = 7,500 \text{units}$$

$$\text{Trousers} = (30,000) * \frac{2}{4} = 15,000 \text{units}$$

$$\text{Blouses} = (30,000) * \frac{1}{4} = 7,500 \text{units}$$

Value:

$$\mathbf{Shirts} = (180,000) * \frac{1}{4} = 45,000\mathbf{Kz}$$

$$\mathbf{Trousers} = (180,000) * \frac{2}{4} = 90,000\mathbf{Kz}$$

$$\mathbf{Blouses} = (180,000) * \frac{1}{4} = 45,000\mathbf{Kz}$$

Thread (allocated according to units produced)

Quantity:

$$\mathbf{Shirts} = (19,000) * \frac{100,000}{270,000} = 7,037.04\mathbf{units}$$

$$\mathbf{Trousers} = (19,000) * \frac{50,000}{270,000} = 3,518.52\mathbf{units}$$

$$\mathbf{Blouses} = (19,000) * \frac{120,000}{270,000} = 8,444.44\mathbf{units}$$

Value:

$$\mathbf{Shirts} = (85,000) * \frac{100,000}{270,000} = 31,481.48\mathbf{Kz}$$

$$\mathbf{Trousers} = (85,000) * \frac{50,000}{270,000} = 15,740.74\mathbf{Kz}$$

$$\mathbf{Blouses} = (85,000) * \frac{120,000}{270,000} = 37,777.78\mathbf{Kz}$$

Direct Labor Cost (DLC) (allocated based on button consumption)

Quantity (in hours):

$$\mathbf{Shirts} = (4,400) * \frac{1}{4} = 1100\mathbf{hours}$$

$$\mathbf{Trousers} = (4,400) * \frac{2}{4} = 2,200\mathbf{hours}$$

$$\mathbf{Blouses} = (4,400) * \frac{1}{4} = 1100\mathbf{hours}$$

Value:

$$\mathbf{Shirts} = (1,075,000) * \frac{1}{4} = 268,750\mathbf{Kz}$$

$$\mathbf{Trousers} = (1,075,000) * \frac{2}{4} = 537,500\mathbf{Kz}$$

$$\mathbf{Blouses} = (1,075,000) * \frac{1}{4} = 268,750\mathbf{Kz}$$

The Unit Work Units (UO) for each product correspond to the total quantity of raw materials, direct labor hours, or machine hours consumed by that product. The calculation proceeds as follows:

For the Procurement Center**Shirts**

$$\begin{aligned} \text{Work Unit (WU)} &= 4,814.815(\text{fabric}) + 7500(\text{buttons}) \\ &+ 7,037.037(\text{thread}) = 19,351.852 \text{units} \end{aligned}$$

Trousers

$$\begin{aligned} (\text{WU}) &= 2,407.407(\text{fabric}) + 15,000(\text{buttons}) + 3,518.519(\text{thread}) \\ &= 20,925.926 \text{units} \end{aligned}$$

Blouses

$$\begin{aligned} (\text{WU}) &= 5,777.777(\text{fabric}) + 7500(\text{buttons}) + 8,444.444(\text{thread}) \\ &= 21,722.222 \text{units} \end{aligned}$$

For the Manufacturing Center

$$\text{Shirts} = 1100 \text{hours}$$

$$\text{Trousers} = 2200 \text{hours}$$

$$\text{Blouses} = 1100 \text{hours}$$

Indirect Production Costs (IPC)

The allocation of indirect production costs is calculated as:

$$(\text{Unit Cost per Work Unit in the Center}) * (\text{Number of Work Units for the Product})$$

Procurement Center

$$\text{Shirts} = (1.597) * 19,351.852 = 30,904.91 \text{Kz}$$

$$\text{Trousers} = (1.597) * 20,925.926 = 33,418.70 \text{Kz}$$

$$\text{Blouses} = (1.597) * 21,722.222 = 34,690.39 \text{Kz}$$

Manufacturing Center

$$\text{Shirts} = (56.641) * 1100 = 62,305.10 \text{Kz}$$

$$\text{Trousers} = (56.641) * 2,200 = 124,610.20 \text{Kz}$$

$$\text{Blouses} = (56.641) * 1,100 = 62,305.10 \text{Kz}$$

As tailoring operates on a made-to-order basis, “(Table 8)” highlights the total production cost of 100,000 shirts assessed: at the supply center at 523,626.573 kz, at 843,862.2358 kz for the production of 50,000 trousers, and a cost of 550,745.488 kz for the production of 120,000 blouses, based on the allocation of indirect costs from the indirect cost allocation table and the assignment of direct costs (raw materials “(Tables 3-5)” and the cost of direct labor included in the auxiliary calculations.

Distribution Cost

The distribution cost for each product is calculated using the following formula:

$$\text{Distribution Cost} = (\text{Unit Distribution Cost}) * \frac{(\text{Total Sales Value})}{\text{Unit Price}}$$

Calculations:

$$Shirts = (0.296) * \frac{3,000,000.00}{25} = 35,520.00Kz$$

$$Trousers = (0.296) * \frac{3,000,000.00}{25} = 35,520.00Kz$$

$$Blouses = (0.296) * \frac{9,600,000.00}{25} = 113,664.00Kz$$

The formula above illustrates how the distribution cost is determined, which is the quotient between the sales of each product and the nature of the unit of work multiplied by the unit cost of work from the main distribution center (Table 7). Thus, considering that the sales of shirts are valued at 3.000.000 kz, the sales of pants are valued at 3.000.000 kz, and the sales of blouses are valued at 2.600.000 kz, and having the same nature of work 25 kz as well as the same unit cost of work 0.296 kz, the distribution cost for shirts is valued at 35.52 kz, for pants at 35.520 kz, and for blouses at 113.664 kz, respectively.

Table 8. Production cost map.

Elements	Quantity	Value	Shirts (100.000)		Trousers (50.000)		Blouses (120.000)	
			Quantity	Value	Quantity	Value	Quantity	Value
Direct Production Cost								
Fabric	13,000	230,000	4,814.815	85,185.185	2,407.407	42,592.592	5,777,778	102,222.222
Buttons	30,000	180,000	7,500	45,000	15,000	90,000	7,500	45,000
Thread	19,000	85,000	7,037.037	31,481.481	3,518.518	15,740.740	8,444,444	37,777.778
MOD	4,400	1,075,000	1,100	268,750	2,200	537,500	1,100	268,750
(1) Sub total	62,000/ 4400	1,570,000	19,351.852/ 1100	430,416.666	20,925.926/ 2200	685,833.332	21.722,222/ 1.100	453,750
Indirect Production Cost								
Procurm.		99,063.829		30,904.9076		33,418.7038		34,690.3885
Manufact.		249,223.552		62,305.1		124,610.2		62,305.1
(2) Sub total		348,287.233		93,209.9076		158,028.9038		96,995.4885
Production Cost		1,918,234.297		523,626.573		843,862.2358		550,745.4885
Production Unit Cost				5.236		16.877		4.589

Table 9. Full cost map.

Elements	Quantity	Value	Shirts		Trousers		Blouses	
			Quantity	Value	Quantity	Value	Quantity	Value
Cost of Finished and Sold Products	270.000	1.918.234,297	100.000	523.626,573	50.000	843.862,2358	120.000	550.745,4885
Distribution Cost		184.712,765		35.520		35.520		113.664
Full or Total Cost		2.102.947,062		559.146,573		879.382,2358		664.409,4885

Table 9 illustrates the total cost incurred by the Tailoring in the production of each product. The total cost of each product is, therefore, the sum of the cost of finished products sold and the distribution cost incurred to sell the same products. Thus, for the product shirts, the total cost is 559,146.573 kz, for pants it is 879,382.2358 kz, and for the production of blouses, it is 664,409.4885 kz, respectively.

Table 10. Analytic result map.

Elements	Quantity	Value	Shirts		Trousers		Blouses	
			Quantity	Value	Quantity	Value	Quantity	Value
Sale Revenue	270,000	15,600,000	100,000	3,000,000	50,000	3,000,000	120,000	9,600,000
Full or Total Cost		2,102,947.062		559,146.573		879,382.2358		664,409.4885
Analytic Result		13,497,052.94		2,440,853.427		2,120,617.764		8,935,590.512
Analytic Result Unit				24.408		42.412		74.463

As can be seen in the “(Table 10)”, the Analytical Result is determined by the difference between the sales of each product (shirts, pants, and blouses) and the total cost incurred for the production of each mentioned product.

The determination of the analytical result was based on what was shown in “(Figure 3)”. Therefore, Uenda Uiza Tailoring recorded a profit of 2,440,853.43 Kz from the sale of 100,000 shirts; a profit of 2,120,617.76 Kz from the sale of 50,000 trousers; and a profit of 8,935,590.51 Kz from the sale of 120,000 blouses.

On a per-unit basis, the profits were as follows: Shirts: 24.41 Kz profit per unit sold, Trousers: 42.41 Kz profit per unit sold, and Blouses: 74.46 Kz profit per unit sold

5.2. Case Study: Simba Bakery

At this point, the data from the Simba Bakery research and the results achieved based on the application of full costing are presented, as well as the expected discussion of the results.

5.2.1. Presentation of Data from Simba Bakery

Table 11. Allocation of indirect costs.

Elements	Auxiliary Centers			Main Centers	
	Administration	Maintenance	Procurement	Manufacturing	Distribution
Personal Expenses	40%	20%	10%	10%	20%
Others Indirect Costs	50%	10%	10%	20%	10%
Administration	?	10%	20%	50%	20%
Maintenance	5%	?	40%	45%	10%
Nature of Work Unit			kg of Row Material Consumed	HMOD	20 kz per sale

In serial production, **Simba Bakery** produces two types of bread: **regular bread** and **sliced bread**. The production process relies on three main raw materials: **flour, yeast, and improver**.

The company employs **30 workers**, distributed as follows: 1 General Director earning **220,000 Kz**; 1 Deputy Director of Administration and Finance earning **130,000 Kz**; 1 Deputy Production Director earning **160,000 Kz**; 1 Secretary earning **90,000 Kz**; 1 Cleaning Assistant earning **50,000 Kz**; The remaining staff are **bakers**, each earning **400 Kz/hour**, working **7 hours per day, 22 days per month**.

In **April 2022**, the company recorded the following accounting information:

Opening Balances

Raw Materials Inventory

Flour – 100,000 kg at 22 Kz/kg

Yeast – 20,000 kg at 20 Kz/kg

Improver – 15,000 kg at 14 Kz/kg

Finished Goods Inventory

Regular Bread – 60,000 units at a unit cost of 30 Kz

Sliced Bread – 20,000 units at a unit cost of 20 Kz

Opening Work-in-Process Inventory

Regular Bread – 2000 units at 50% completion, with an estimated production cost of 60,000.00 Kz

Sliced Bread – 1500 units at 70% completion, with an estimated production cost of 42,000.00 Kz

Raw Material Purchases

Flour – 100,000 kg at 25 Kz/kg

Yeast – 30,000 kg at 15 Kz/kg

Improver – 10,000 kg at 10 Kz/kg

Yeast – 20,000 kg at 8 Kz/kg

Improver – 15,000 kg at 11 Kz/kg

Flour – 3,000 kg at 15 Kz/kg

Note: raw materials will be directly affected in production according to the products produced, observing the guidance in “**(Figure 1)**”.

Production Output (April 2022)

Regular Bread – 100,000 units

Sliced Bread – 50,000 units

Selling Prices:

Regular Bread – 40 Kz per unit

Sliced Bread – 85 Kz per unit

Closing Inventories

Raw Materials Inventory

Flour – 20,000 kg

Yeast – 5000 kg

Improver – 2000 kg

Finished Goods Inventory

Regular Bread – 20,000 units

Sliced Bread – 10,000 units

Work-in-Process Inventory

Regular Bread – 5,000 units at 80% completion

Sliced Bread – 1,000 units at 60% completion

The allocation of indirect costs was carried out according to the breakdown shown in the following “(Table 11)”, according “(Figure 2)”.

The direct costs are allocated as follows:

- ✓ Flour, Yeast, and Direct Labor (MOD) are distributed based on the number of units produced;
- ✓ Improver is allocated using a fixed percentage: 15% for Regular Bread and 85% for Sliced Bread.

In addition to personnel expenses, the company also incurs other indirect costs amounting to 760,000 Kz.

Additional Information: The company applies the FIFO valuation method (*First In, First Out*).

Objectives:

- ✓ To determine the production cost of each product;
- ✓ To determine the cost of finished production for each product during the period;
- ✓ To calculate the full cost of finished goods sold for each product;
- ✓ To determine the total and unit-level analytical profit for the company.

Note: The exchange rate between the currency kwanza and dollar: 1 usd is equal to 1000 kz.

5.2.2. Resolution and Discussion of the Results of Simba Bakery

Step 1: Allocation of Indirect Costs Using the Homogeneous Sections Method

First, the values of **indirect costs** and the **number of work units** for the main cost centers are calculated, based on the nature of work specific to each center.

Table 12. Indirect labor cost map (ILC).

Position	Quantity	Unit Salary (kz)	Total (kz)
General Director	1	220,000.00	220,000.00
Deputy Director	1	130,000.00	130,000.00
Secretary	1	90,000.00	90,000.00
Cleaning Assistant	1	50,000.00	50,000.00
Total	4		490,000.00
Total Indirect Labor Cost (ILC)			490,000.00 (Personnel expenses)

Direct Labor Cost (DC)

The salary of administrative workers looking at the “(Table 12)” is assessed at 490,000 kz, what is the sum of all salaries, corresponding to workers who do not

come into direct contact with the production of Padaria Simba. This includes the General Director, the Deputy Administrative Director, secretary, and cleaning assistant.

$$\text{Deputy Production Director's salary} = 160,000.00Kz$$

$$\begin{aligned} \text{Total salary of operational workers} &= (25\text{workers}) * \left(400 \frac{Kz}{\text{hour}}\right) * \left(7 \frac{\text{hours}}{\text{day}}\right) * \left(22 \frac{\text{days}}{\text{month}}\right) \\ &= 1,540,000.00Kz \end{aligned}$$

$$\begin{aligned} \text{Total Direct Labor Cost (DLC)} &= 160,000.00 + 1,540,000.00 \\ &= 1,700,000.00Kz \end{aligned}$$

As can be seen in the auxiliary calculations, the cost of direct labor corresponding to the salaries of specialists or bakers has been determined. Thus, the cost of direct labor including the salary of the Deputy Production Director is 1,540,000 kz. It should be noted that, for the bakers, it is the product of the number of bakers who worked during that period, the number of hours worked per day, the number of days worked per month, and the cost per hour worked. Calculation of the Number of Work Unit (N° WU) for the Main Centers

- Procurement (Kg of Row Material Consumed)

Table 13. Raw material inventory: Flour, Method: FIFO.

Purchase	Quantity	Unit Cost (kz)	Total Cost (Kz)		Quantity	Weighted Average Unit Cost (Kz)	Total Output Cost (Kz)
OI	100,000	22.00	2,200,000.00		100,000	22.00	2,200,000.00
P1	100,000	25.00	2,500,000.00		83,000	25.00	2,075,000.00
P2	3000	15.00	45,000.00	Output	183,000		4,275,000.00
	203,000		4,745,000.00	Ef	17,000	25.00	425,000.00
					3000	15.00	45,000.00

Table 14. Raw material inventory: Yeast, Method: FIFO.

Purchase	Quantity	Unit Cost (kz)	Total Cost (Kz)		Quantity	Weighted Average Unit Cost (Kz)	Total Output Cost (Kz)
OI	20,000	20.00	400,000.00		20,000	20.00	400,000.00
P1	30,000	15.00	450,000.00		30,000	15.00	450,000.00
P2	20,000	8.00	160,000.00		15,000	8.00	120,000.00
	70,000		1,010,000.00	Output	65,000		970,000.00
				CI	5,000	8.00	40,000.00

Observing the “(Tables 13-15)” report the quantities of raw materials used in the production of 140,000 regular loaves and 60,000 sliced loaves, for which 183,000 kg of wheat flour “(Table 13)”, 65,000 grams of yeast “(Table 14)”, and 38,000 grams of improver “(Table 15)” were consumed, respectively.

Table 15. Raw material inventory: Improver, Method: FIFO.

Purchase	Quantity	Unit Cost (Kz)	Total Cost (Kz)	Quantity	Weighted Average Unit Cost (Kz)	Total Output Cost (Kz)
OI	15,000	14.00	210,000.00	15,000	14.00	210,000.00
P1	10,000	10.00	100,000.00	10,000	10.00	100,000.00
P2	15,000	11.00	165,000.00	13,000	11.00	145,000.00
	40,000		475,000.00	Output 38,000		453,000.00
				CI 2,000	11.00	22,000.00

Procurement Center

The number of work units for the Procurement Center corresponds to the total kilograms of raw materials consumed:

$$UO(\text{Procurement}) = 183,000\text{kg}(\text{flour}) + 65,000\text{kg}(\text{yeast}) + 38,000\text{kg}(\text{improver}) = 286,000\text{kg}$$

Manufacturing Center (Direct Labor Hours)

The number of work units for the Manufacturing Center reflects the total hours dedicated by the bakers to transforming flour, yeast, and improver into regular and sliced bread. It is calculated as follows:

$$\begin{aligned} UO(\text{Manufacturing}) &= (25\text{bakers}) * \left(7 \frac{\text{hours}}{\text{day}}\right) * \left(22 \frac{\text{working days}}{\text{month}}\right) \\ &= 3,850\text{hours} \end{aligned}$$

Distribution Center (20 Kz per sale)

The number of work units for the Distribution Center is calculated by dividing the **total sales revenue** by the unit cost associated with the distribution activity (20 Kz per sale), “as shown **Table 11**”.

Therefore, to determine the number of distribution work units, it is necessary to first calculate the total sales value.

Table 16. Sale revenue map.

Elements	Quantity	Unit Price	Value
Regular Bread	140,000	40.00	5,600,000.00
Sliced Bread	60,000	85.00	5,100,000.00
Total	200,000		10,700,000.00

The sales for the period under review of Padaria Simba, considering the sales of Normal Bread which is 5,600,000 kz and Sandwich Bread which is 5,100,000 kz, amounting to a total of 10,700,000 kz (**Table 16**), are the total sales of this Bakery for the period.

$$N^{\circ}WU(\text{Distribution}) = \frac{10,700,000}{20} = 535,000$$

After determining the indirect costs associated with the Procurement Center

and Sliced Bread production, including Indirect Labor Costs (ILC) and other indirect overheads, and after calculating the nature of work units for the main cost centers, the first and second allocations are performed using the allocation keys provided in the exercise, “as shown **Table 11**” regarding the distribution keys. In the second allocation, the values of the auxiliary centers to be redistributed result from the total amount obtained in the first allocation, plus the percentage received from reciprocal services rendered by other auxiliary centers. This interdependency gives rise to a system of simultaneous equations, due to the mutual service relationship between the two auxiliary cost centers.

$$\begin{cases} Adm. = 576,000 + 5\% Man & Adm. = 576,000 + 0.05Man \\ Main. = 174,000 + 10\% Adm & Main. = 174,000 + 0.1Adm \end{cases} \leftrightarrow$$

Inserting the second equation into the first:

$$Adm = 576,000 + 0,05 * (174,000 + 0.1Adm)$$

$$Adm = 576,000 + 8,700 + 0.005Adm$$

$$Adm - 0.005Adm = 584,700$$

$$0.995Adm = 584,700$$

$$Adm = \frac{584,700}{0.995} \quad Adm = 587,638.191$$

Inserting the value of Adm in to the second equation:

$$Man = 174,000 + 0.1 * (587,638.191)$$

$$Man = 174,000 + 58,763.819$$

$$Man = 232,763.819$$

Table 17. Indirect costs allocation map.

Elements	Total	Auxiliary Centers			Main Centers	
		Administration	Maintenance	Procurement	Manufacturing	Administration
Personal Expenses	490,000.00	196,000.00	98,000.00	49,000.00	49,000.00	98,000.00
Other Indirect costs	760,000.00	380,000.00	76,000.00	76,000.00	152,000.00	76,000.00
Total from the First Allocation	1,250,000.00	576,000.00	174,000.00	125,000.00	201,000.00	174,000.00
Administration		(587,638.191)	58,763.819	117,527.638	293,819.095	117,527.638
Maintenance		11,638.191	(232,763.819)	93,105.528	104,743.719	23,276.382
Total from the Second Allocation	1,250,000.00	0	0	335,633.17	599,562.81	314,804.02
Nature of Work Unit				kg of Row Material Consumed	HMOD	20 kz per sale
N° WU				286.000	3.850	535.000
Work Unit Cost				1.174	155.731	0.588

All indirect costs incurred during the production process of Simba Bakery are mentioned in this “(Table 17)” taking into account the auxiliary and main centers, as well as the keys for distributing these costs to the centers as being the data collected at Simba Bakery. As the totals of the auxiliary centers were transferred to the main centers through the application of the algebraic method, it can be noted in “(Table 17)” that, of the indirect costs, the main center Supply is valued at 335,633.17, Factory 599,562.81 and Distribution 314,804.02 and, with unit work costs evaluated at 1.174 kz, 155.731 and 0.588, respectively. These costs will be imputed to the products in the production cost map.

Step 2: Determination of Production Cost ($PC = DPC + IPC$)

$(PC = \text{Direct Production Costs} + \text{Indirect Production Costs})$

Direct Production Costs (DPC)

The allocation of direct costs based on units produced is given by the following formula:

$$(\text{Cost or Quantity to be Allocated}) * \frac{\text{Units Produced of the Product}}{\text{Total Units Produced}}$$

Flour (Allocated Based on Units Produced)

Quantity:

$$\text{Regular Bread} = (183,000) * \frac{100,000}{150,000} = 122,000\text{kg}$$

$$\text{Sliced Bread} = (183,000) * \frac{50,000}{150,000} = 61,000\text{kg}$$

Value:

$$\text{Regular Bread} = (4,275,000) * \frac{100,000}{150,000} = 2,850,000\text{Kz}$$

$$\text{Sliced Bread} = (4,275,000) * \frac{50,000}{150,000} = 1,425,000\text{Kz}$$

Yeast (Allocated Based on Units Produced)

Quantity:

$$\text{Regular Bread} = (65,000) * \frac{100,000}{150,000} = 43,333.33\text{kg}$$

$$\text{Sliced Bread} = (65,000) * \frac{50,000}{150,000} = 21,666.67\text{kg}$$

Value:

$$\text{Regular Bread} = (970,000) * \frac{100,000}{150,000} = 646,666.67\text{Kz}$$

$$\text{Sliced Bread} = (970,000) * \frac{50,000}{150,000} = 323,333.33\text{Kz}$$

Improver (15% allocated to Procurement Center and 85% to Sliced Bread)

Quantity:

$$\text{Regular Bread} = 38,000 * 15\% = 5,700\text{kg}$$

$$\text{Sliced Bread} = 38,000 * 85\% = 32,300\text{kg}$$

Value:

$$\text{Regular Bread} = 453,000 * 15\% = 67,950.00\text{Kz}$$

$$\text{Sliced Bread} = 453,000 * 85\% = 385,050.00\text{Kz}$$

Direct Labor Cost (DLC—Allocated Based on Units Produced)

Quantity (Hours):

$$\text{Procurement Center} = (3,850) * \frac{100,000}{150,000} = 2,566.67\text{hours}$$

$$\text{Sliced Bread} = (3,850) * \frac{50,000}{150,000} = 1,283.33\text{hours}$$

Value:

$$\text{Procurement Center} = (1,700,000) * \frac{100,000}{150,000} = 1,133,333.33\text{Kz}$$

$$\text{Sliced Bread} = (1,700,000) * \frac{50,000}{150,000} = 566,666.67\text{Kz}$$

Indirect Production Costs (IPC)

The allocation of indirect production costs is calculated using the formula:

$$(\text{Unit Cost of Work in the Cost Center}) * (\text{Number of Work Units for the Product})$$

Note: The **Number of Work Units (N° UO)** corresponds to the total amount of raw materials, direct labor hours, or machine hours consumed by each product.

Procurement Center

Work Units (UO):

$$\text{Procurement Center} = 122,000 + 43,333.33 + 5,700 = 171,033.33\text{units}$$

$$\text{Sliced Bread} = 61,000 + 21,666.67 + 32,300 = 114,966.67\text{units}$$

Unit Cost of Work: 1.174 Kz/unit

$$\text{Procurement Center} = 1.174 * 171,033.33 = 200,714.89\text{Kz}$$

$$\text{Sliced Bread} = 1.174 * 114,966.67 = 134,918.27\text{Kz}$$

Manufacturing Center

Work Units (HMOD hours):

$$\text{Procurement Center} = 2,566.67\text{hours}$$

$$\text{Sliced Bread} = 1,283.33\text{hours}$$

Unit Cost of Work: 155.731 Kz/hour

$$\text{Procurement Center} = 155.731 * 2,566.67 = 399,708.54\text{Kz}$$

$$\text{Sliced Bread} = 155.731 * 1,283.33 = 199,854.27\text{Kz}$$

“**Table 18**” therefore highlights the production cost of the started and finished parts. As can be seen, 100,000 normal loaves of bread were produced at a cost of 5,298,373.435 and 50,000 sliced loaves valued at 3,034,822.545 kz. This is the sum

of the direct costs (raw materials and direct labour) assumed and the indirect costs of the main centres (supply and factory) coming from the indirect costs distribution map. It should be noted that the main distribution centre is treated separately as it is an activity carried out after production. Next, the cost of initial production in progress is added to the production cost.

Table 18. Production cost.

Signature	Quantity	Value	Normal Bread (100.000)		Sliced Bread (50.000)	
			Quantity	Value	Quantity	Value
Direct Production Cost						
Flour	183.000	4.275.000,00	122.000	2.850.000,000	61.000	1.425.000,000
Yeast	65.000	970.000,00	43.333,333	646.666,666	21.666,666	323.333,333
Enhancer	38.000	453.000,00	5.700	67.950,00	32.300	385.050,00
Direct Labor	3.850	1.700.000,00	2.566,666	1.133.333,333	1.283,333	566.666,666
(1) Subtotal	286.000/ 38.000	7.398.000,00	171.033,333/ 2.566,666	4.697.950,000	114.966,666/ 1.283,333	2.700.050,000
Indirect Production Cost						
Procurement		335.633,166		200.714,89		134.918,27
Factory		599.562,814		399.708,543		199.854,271
(2) Subtotal		935.195,98	-	600.423,435	-	334.772,545
Production Cost (1 + 2)		8.333.195,98		5.298.373,435		3.034.822,545

Step 3: Determination of the Cost of Finished Production (CFP)

Considering that the company under analysis operates under a **phase-based or mass production regime**, the **Cost of Finished Production (CFP)** is determined using the **indirect costing method**, according to the following formula:

$$CFP = OWIP + PC - CWIP$$

where:

- ✓ **OWIP** = Opening Work-in-Process Inventory
- ✓ **PC** = Total Production Costs
- ✓ **CWIP** = Closing Work-in-Process Inventory

Table 19. Equivalent unit of actual production map.

Products	Finished Production (FP)	Closing WIP (CWIP)	Opening WIP (OWIP)	Equivalent Production (EUP)
Regular Bread	100,000	5,000 * 80% = 4.000	2,000 * 50% = 1.000	103,000
Sliced Bread	50,000	1,000 * 60% = 600	1,500 * 30% = 450	50,150
Total	150,000	4600	1450	153,150

For companies that produce in series, as is the case at Padaria Simba, they work in shifts and each shift finds and leaves some production in progress which, de-

pending on the moment, each shift will find a production in progress and leave a production which will be called final production in progress. To do this, there is a complete need to calculate the effective equivalent units 153,150 (“Table 19)” of the period, in this case, normal bread gave 103,000 and sliced bread 50,150, in order to be able to determine the unit cost of the final production in progress, through the unit cost arising from the quotient between the total cost and the total equivalent units which is used in determining the cost of the final production in progress.

Valuation of Closing Work-in-Process (CWIP)

According to the FIFO method, the Closing Work-in-Process (CWIP) is valued at the equivalent unit cost (EUC) of the current period’s Equivalent Units of Production (EUP). That is:

$$CWIP = EUP \text{ component cost} * \text{Percentage of completion (per element)}$$

This ensures that only the costs of the current production period are considered when valuing the CWIP, excluding any costs carried over from the opening inventory.

Table 20. Valuation of closing wip map.

Products	Equivalent Units of Production (EUP)	Productio Cost	Equivalente Unit Cost (EUC)	CWIP Equivalent Units	CWIP Value
Regular Bread	103,000	5,298,373.43	51.44	4,000	205,762.08
Sliced Bread	50,150	3,034,822.55	60.51	600	36,308.94
Total	153,150	8,333,195.98		4,600	242,071.02

It can now be seen in (“Table 20)” the cost of the final ongoing production which, in relation to the products, is the product between the unit cost of the effective production (CUPE) and the equivalent quantities or units of the final ongoing production. For normal bread the cost is 205,762.08 and for sliced bread it is 36,308.94, meaning that the total cost of the final ongoing production is 242,071.02 kz. This last cost is removed from the cost of the finished production of the period.

Table 21. Cost of finished production map.

Rubrica	Quantity	Value	Regular Bread		Sliced Bread	
			Quantity	Value	Quantity	Value
Opening WIP	1450	42,600.00	1000	30,000.00	450	12,600.00
Finished Production (Effective)	153,150	8,333,195.98	103,000	5,298,373.43	50,150	3,034,822.55
Closing WIP	4,600	242,071.02	4000	205,762.08	600	36,308.94
Cost of Finished Production	150,000	8,133,724.96	100,000	5,122,611.360	50,000	3,011,113.601
Unit Cost of Finished Production (UCFP)				51.226		60.222

In March 2022, Simba Bakery produced:

Now, if you can observe the Cost of Finished Production for the Period of Simba Bakery in the month of March of the year 2022, it produced 100,000 units of Normal Bread having supported a cost evaluated at 5,122,611.360 kz, and 50,000 units of Sliced Bread having supported a total cost of 3,011,113.601 kz, as being the sum of the cost of initial production in progress (CPCI) plus the cost of effective production (CPE) minus the cost of final production in progress (CPCF). In the production of a unit of Normal Bread, the company incurs a cost of 51.226 kz and a cost of 60.222 in the production of a unit of Sliced Bread (“Table 21”).

Step 4: Determination of Full Cost

($FC = \text{Cost of Goods Sold} + \text{Distribution Cost}$)

$$COGS = OIFG + FP - CIFG$$

where:

- ✓ COGS = Cost of Goods Sold or Cost of Finished and Finished Production;
- ✓ OIFG = Opening Inventory of Finished Goods;
- ✓ CIFG = Closing Inventory of Finished Goods

Inventory of Goods

Table 22. Product inventory: Regular Bread, Method: FIFO.

Production	Quantity	Unit Cost (kz)	Total Cost (Kz)		Quantity	Weighted Average Unit Cost (Kz)	Total Output Cost (Kz)
OI	60,000	30.00	1,800,000.00		60,000	30.00	1,800,000.00
P1	100,000	51.23	5,122,611.36		80,000	25.00	4,098,089.09
	160,000		6,922,611.36	Output	140,000		5,898,089.09
				CI	20,000	51,23	1,024,522.27

Table 23. Product inventory: Sliced Bread, Method: FIFO.

Production	Quantity	Unit Cost (kz)	Total Cost (Kz)		Quantity	Weighted Average Unit Cost (Kz)	Total Output Cost (Kz)
OI	20,000	20.00	400,000.00		20,000	20.00	400,000.00
P1	50,000	60.22	3,011,113.60		40,000	60.22	2,408,890.88
	70,000		3,411,113.60	Output	60,000		2,808,890.88
				CI	10,000	60,22	602,222,72

Since there was initial production (found) and final ongoing production (left) in addition to started and finished production, there is every need to inventory the stock of finished products in the warehouse (“Table 22 and Table 23”). These tables illustrate the finished units sold in the period for each product produced and their corresponding cost. Thus, for normal bread 140,000 were sold at a cost of 5,898,089.09 kz (“Table 22”) and for sliced bread 60,000 units were sold at a cost of 2,808,890.88 (“Table 23 kz”).

Distribution Costs

The distribution costs are allocated proportionally based on total sales revenue, using a standardized rate per unit sold. The formula applied is:

$$Distribution\ Cost = (Rate\ per\ Sale\ Unit) * \frac{Total\ Sales\ Revenue}{Standard\ Divider}$$

According to the formula above, the distribution cost is given by the quotient between the sales of each product and the unit work nature multiplied by the cost of the unit work of the main distribution center (Table 11). Thus, since the sales of regular bread are valued at 5.600.000 kz and of sliced bread are valued at 5.100.000 kz, both having the same work nature 20 kz as well as the same unit work cost 0,588 kz, the distribution cost for regular bread is valued at 164.757,24 kz and for sliced bread at 150.046,78 kz, respectively.

Table 24. Full cost map.

Elements	Quantity	Value	Regular Bread		Sliced Bread	
			Quantity	Value	Quantity	Value
Cost of Goods Sold (COGS)	200,000	8,706,979.97	140,000	5,898,089.09	60,000	2,808,890.88
Distribution Cost		314,804.02		164,757.24		150,046.78
Full Cost (COGS + DC)		9,021,783.99		6,062,846.33		2,958,937.66

“Can be seen in Table 24,” the total or complete cost incurred by Padaria Simba in the production of each product. Therefore, the sum of the cost of finished products sold and the distribution cost assumed to sell the same products. Thus, for the product Normal Bread, the total assumed cost is 6,062,846.33 kz, and in the production of Sliced Bread, it assumed a total cost of 2,958,937.66 kz, respectively.

Table 25. Analytical result map.

Elements	Quantity	Value	Regular Bread		Sliced Bread	
			Quantity	Value	Quantity	Value
Sale Revenue	200,000	10,700,000.00	140,000	5,600,000.00	60,000	5,100,000.00
Full Cost		9,021,783.99		6,062,846.33		2,958,937.66
Analytical Result	200,000		140,000	462,846.33	60,000	2,141,062.34
Unit Analytical Result				3.306		35.684

The Analytical Result is the difference between the sales of each product (shirts, pants, and blouses) and the total cost incurred for the production of each mentioned product, according to “(Table 25).” It was based on what was shown in “(Figure 4)”. In April 2022, Simba Bakery recorded a net profit of 2,141,062.34 Kz from the sale of 60,000 units of Sliced Bread, and a net loss of 462,846.33 Kz from the sale of 140,000 units of Regular Bread (Procurement Center).

This corresponds to:

- ✓ A unit profit of 35.684 Kz for each Sliced Bread sold; and
- ✓ A unit loss of 3.306 Kz for each Regular Bread sold.

These results reflect significant variations in cost structure and profitability per product, indicating the need for strategic pricing review and potential cost optimization, particularly for the Regular Bread line.

6. Conclusion

Following the successful implementation of the full costing system in both companies, according to each one's respective production regime and based on the data collected, the following conclusions can be drawn:

- The methodology for applying the full or absorption costing system depends on the company's operational model, which serves as a barometer for the method's effectiveness.
- Despite having been applied in two companies with different production regimes, the proposed methodology is adaptable to any organization, regardless of its size. It is sufficient to collect empirical data and follow the structured steps illustrated in this study.
- The analysis confirms that aligning the costing method with the production model is essential for producing accurate accounting information that reflects the operational reality of the organization.
- As observed in the applications, companies operating under a make-to-order regime do not need to calculate the Cost of Finished Goods for the period, since production is driven by specific customer orders. In such cases, the concept of Work-in-Process (initial or final) becomes irrelevant, as the goods are manufactured exclusively to fulfill existing requests.
- In contrast, for companies operating under a continuous production regime, considering work-in-process costs is essential. The ongoing nature of production and the existence of successive shifts necessitate the recording of products at various stages of completion. At the start of operations in a continuous regime, an initiating shift may find no work-in-process inventory but will inevitably leave behind unfinished goods to be inherited by the next shift—thus ensuring a consistent flow of partially and fully completed units within the organization.
- Ignoring this cost factor in companies that operate non-stop (24/7) may result in distorted analyses, undermining the accuracy of cost measurement and, consequently, impairing the formulation of appropriate management strategies. The omission of work-in-process accounting can lead to inconsistent information, which may in turn cause misguided decisions regarding pricing, profitability, and inventory control.

The proper application of the full costing system must take into account the specific characteristics of each company's production regime. The alignment between the chosen accounting methodology and the operational structure not only enhances cost management but also contributes to greater organizational effi-

ciency and competitiveness.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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