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Customer Profitability Analysis and Resource Consumption Accounting: A Holistic Approach

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The objective of this paper is to demonstrate the application of consumer productivity analysis (CPA) in Iraqi manufacturing companies, using Resource Consumption Accounting (RCA). A case study in Iraq's Babylon Tires Factory was performed. For the collection of data, surveys, direct observations and documents were used. The findings show that with RCA, some customer categories deemed unprofitable under traditional costing system were assessed as profitable. The case study also revealed the cost to factory products and customers of idle resources. Based on the findings, the factory management is better able to understand the productivity of different consumer segments and correct its strategies. In addition, RCA's unused production costs are considered to provide an incentive for factory management to better match the capacity provided in divisions. For manufacturing firms in general and in the case study in particular, there is limited research related to profitability analysis. This paper is therefore unique in the sense that it analyses the use of CPA RCA systems in Iraqi manufacturing firms.

Key words: *CPA, RCA, Costs Allocation, Traditional costing system, competitive advantage.*

Introduction

The environment in which companies operate is increasingly dynamic and complex because of ongoing changes in technology, competition and policy. As a result, they need a sophisticated cost management system that reflects those variables in a timely manner, and is able to help management make the right decisions. These changes in the business environment have left great pressures on companies to reduce their products' cost, and in their ability to compete with foreign products, as well as satisfy their customers through rapid responses to changes in their desires. Traditional cost systems are also unable to meet

management needs in the light of technological developments, as they cannot provide adequate information to achieve the requirements of success in this environment. Time-Driven Activity Based Costing (TDABC) has finally emerged as an integrated and comprehensive cost management system that combines the principles of German cost management with activity-based costing. Its efficient use involves features that achieve a significant improvement on cost management and other systems. Generally speaking, customer cost information is essential for managerial decision-making. Therefore, understanding the true costs of serving specific customers is important in any organisation. Companies that understand which customers are more profitable and which are not, are armed with valuable information needed to make successful managerial decisions to improve overall organisational profitability (van Raaij, Vernooij, & van Triest, 2003).

Given the above, this study aims to demonstrate the effectiveness of the use of Resource Consumption Accounting (RCA), in reducing the cost of products and rationalising the analysis of customer profitability. The study also aimed at identifying the shortcomings of traditional cost systems currently used in most Iraqi companies, which are unable to keep pace with developments in the field of cost management and provide the necessary information to rationalise pricing decisions and achieve competitive advantage.

Literature Review

The move towards Resource Consumption Accounting

Researchers efforts in the field of accounting measurement resulted in the emergence of RCA in 2000. It is considered one of the advanced approaches to the measurement and allocation of costs in America and many European countries.

The system of RCA is the latest development in modern management accounting. It is based on the philosophy that the resources owned by the organisation causes costs and therefore should be focused on, in the calculation of those resources and what is consumed from them (Okutmus, 2015, Al-Hibari & Al-Matari, 2019; Al-Rawi & al-Hafiz, 2018; Amusawi, Kbelah, & almagtome, 2019; Elshahat, 2016; Kbelah, Amusawi, & Almagtome, 2019; Liu & Wang, 2017).

Brouwer, van den Broek, Zappa, Turkenburg, and Faaij (2016) portray RCA as a management theory, one that describes a dynamic and fully integrated system based on the principle and approach of comprehensive management accounting, that supports managers with decisional information to improve projects. It is a relatively new, flexible and comprehensive management accounting approach that is largely based on the German accounting approach GPK. The definition above focuses on a comprehensive and integrated approach to management accounting. It provides managers with the appropriate information

to make appropriate decisions within the institution, which supports its competitive position in the business environment. Köse and Agdeniz (2015) argue that it is a comprehensive and integrated cost management system that focuses primarily on creating information for optimal enterprise decision-making, to model resource consumption and costs. It is clear from the above definition that RCA divides energies into three productive, non-productive and idle sections.

Liu and Wang (2017) emphasise that RCA is a resource-oriented approach to cost allocation. It improves the traditional activity-based costing method, to enhance cost management of the strategic system and uses resources as a key objective that enables measurement of idle resources. That not only improves the accuracy of cost allocation but also provides information on management's responsibility to assess performance. This helps in scientific decision-making and enhances competitive advantage. Based on this definition, it is clear to us that it focuses on the decision-making outlook. Furthermore, by recognising idle energy, RCA helps to eliminate resources that do not support the organisation's competitive position. Inanlou, Hassanzadeh, and Khodabakhshi (2014) also consider that RCA is the approach to dynamic, comprehensive, integrated and principles-based management accounting that provides managers with decision support information to improve projects. As well, it is a relatively new management accounting approach that is flexible and comprehensive, based largely on the German management accounting approach (Grenzplankostenrechnung), and allows the use of activity-based routers. Through the definition above we find it focused on providing accurate information to managers for the purpose of decision-making, by generating information and reports to various levels of management to help them make decisions to reduce costs and have effective use of resources under their control. The process of applying RCA begins with interrelationships between production and service divisions. Through this process, the principles of this approach are used to determine the costs allocated to specific resource pools. To build a model for this approach, managers must understand all the interrelationships between resources. The components of RCA mentioned in the second section interact, to measure the cost target share of consumed resources as follows:

Step 1: Determine the available resources spent on the products.

Accounting for the consumption of resources through control and planning at the level of resources has a paramount advantage. You must identify all the resources of the economic unit available (personnel - machinery - cash - buildings, etc.), which represents the basic and first step in the application of this entry, considering that resources are available to the unit. The economy gets the operating capacities of production (White, 2009).

Step 2: - Identify resource pools.

After the resource allocation process, resources are grouped into monolithic clusters based on interrelationships of technology, skills or homogeneity in terms of cost elements. Resource

characteristics should be combined and result in monolithic clusters, thus converting these costs into other resource pools or to the final outputs (Webber & Clinton, 2004).

Step 3: - Identify elements of direct costs to products.
This step is a breakdown of the direct costs spent on the cost target for easy tracking (Al-Debs, 2015: 333).

Step 4: Separate variable and fixed costs in resource pools.
In this step, costs in resource pools are separated into fixed and variable costs according to the method of resource consumption. The use of fixed costs is determined by the theoretical power of resources, while the variable costs are allocated, based on the outputs of the budgeted resources (Al-Rawi & al-Hafiz, 2018).

Step 5: Determine the causes of resources for each resource pool.
In this step, the causes of resource costs are defined as the quantitative measure of the size of the expected resource outputs. These include direct working hours, machine hours and other causes. It also expresses the volume of resources to be spent in each resource pool, to reach a certain output size which is not present in any other approach (Perkins & Stovall, 2011).

Step 6: Determine the theoretical and practical energies and percentages of resource pools.
In this step, the capacity of the resource pools will be determined and two types of rates extracted, to allocate resource costs to the activities. A fixed cost rate and a variable cost rate are specified. The fixed rate equals the total fixed cost of the resource pool, divided by the theoretical capacity of the same complex. The variable logic of dividing the total variable costs of the resource pool, by the practical energy of the same complex, is the logic behind the use of theoretical and practical energy. Theoretical energy represents the availability or processing of resources. This represents the expected demand for the output of the resource complexes, which is placed on demand for the product. In this way, it is possible to accurately detect unused energy, whether it is surplus, idle or lost. The use of theoretical energy instead of available energy greatly helps in stabilising the loading rates, and fixed costs, because they do not vary from one period to another due to different circumstances (Perkins & Stovall, 2011).

Step 7: Identify and allocate the cost of resource pools to activities.
This step first identifies the pool of resources consumed. It is according to activities, based on the concept that they consume resources, since any activity that does not consume certain resources is not charged any share of the cost of those resources. The costs of specific resources are allocated to the activities using the resource cost triggers. Once resource capacities are identified, it is necessary to calculate their costs, to determine the amount of resources used by the activities and then determine the costs of idle energy. This draws the management's

attention in making decisions about idle energy costs, to whether to reduce or eliminate them, encouraging their best use (Köse & Ağdeniz, 2017).

The Traditional Approach of CPA

Increased scientific competition has led to an increasing interest in economic units in customers in the last century. That is reflected in the growing interest in customer profitability (CP) and its factors. Customer service and direct long-term relationships are seen as key factors in competition (Barfield, Raiborn, & Kinney, 1994). Therefore, we find that customers have received a lot of attention from economic units. In this context many recent management studies stressed the importance of focusing on customers, to ensure competition by meeting their desires and gain loyalty. The most important of these methods are customer relationship management, customer value, customer profitability analysis. They are relevant for the purpose of studying customers' requirements and needs, as well as the collection of data related to them and work to provide all their needs for high-quality products or services, at the lowest cost. Customer value is a critical concept for generating profitability, focusing on the customer as the main driver of revenue, adopting customer value as a key approach to revenue management Nawaz (2016). After clarifying the concept of customer profitability, the researcher finds it necessary to highlight the concept of customer value. Some benefits that the customer receives from products or services include quality, price, convenience, on-time delivery and services received by the customer before and after the sale.

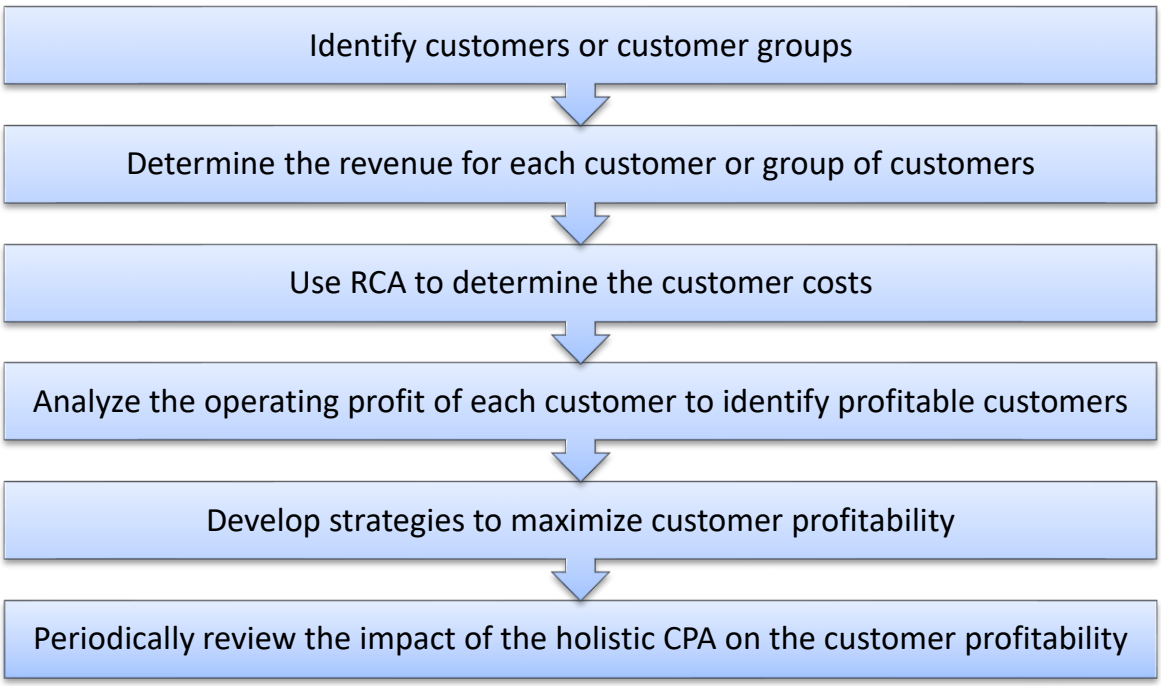
Customer profitability analysis plays an increasingly important role as the economic unit moves from a product-centred approach, to a customer-centered approach (Sridhar & Corbey, 2015), as customers are treated as intangible assets (Hassan & Tabasum, 2018). Through the practical reality of economic units, profitable and non-profit customers are not distinguished, but who is the most profitable customer, or the largest clients is known. The end result is that the profitability of all customers is not known.
In this light, customer profitability analysis has attracted attention for both management accounting and marketing (Albalaki & Majeed, 2018). The importance of understanding which customers contribute to the profitability of the economic unit, and the importance of attracting and maintaining the most profitable customers, is widely recognised. In general, units that are interested in the reasons why some customers are most profitable will be equipped with valuable and necessary information, to improve their performance (Pitcher, 2013). With the advent of activity-based costing in the 1990s, researchers in management accounting were interested in the factors affecting customer service costs and profitability, and in using this information to improve the management and control of customer services and appropriate operations (Niraj, Gupta, & Narasimhan, 2001). Customer profitability analysis has been defined by many researchers (Fang, Jiang, & Song, 2016; Fish, Miller, Becker, & Pernsteiner, 2017; Godinho, Dias, & Torres, 2019; Gouveia, Nunes, & Afonso, 2016; Järvinen & Väätäjä, 2018). The Chartered Institute of Management Accountants (CIMA) defined Customer

Profitability Analysis (CPA) as "an analysis of the revenue streams and service costs associated with particular customers or customer groups" and as enabling the allocation of revenue and costs to an individual customer or customer group (Sridhar & Corbey, 2015). "CPA" is defined as a "method of recording and analysing all revenues generated by customers, whether at the individual or group level, and the costs incurred to earn those revenues, in order to determine the contribution of each customer or group of customers to the profits of the economic unit and this means that profits are calculated at the customer level rather than products" (Mohamed, 2016). Accordingly, a customer profitability analysis is a "technique for recording and analysing all revenues generated by customers, both at the individual and group levels, and the costs incurred by the economic unit to earn these revenues, within a certain period of time, to see the contribution of each customer. Or a group of customers in making a profit of economic unity".

A Holistic Approach to Customer Profitability Analysis

This paper suggests that a holistic approach for analysing customer profitability seeks the advantages achieved by the accounting of resource consumption in the field of cost reduction, as mentioned above. Accordingly, the steps to analyse customer profitability in accordance with the proposed mechanism, focusing on the steps affected by the application of the resource consumption accounting approach, will be as indicated in Figure 1 below.

Figure 1. The steps of Holistic CPA



Step 1: Identify customers or customer groups

The basis for identifying customers varies depending on the company and sector in which it operates. In general, one or both methods can be used to identify customers for analysis purposes:

1. Demographic breakdown based on observable characteristics such as geographical area, customer age, gender and income level.
2. Segmentation based on the size of customer needs and behavior such as making customer purchases or mix products and others.

Step 2: Determine the revenue for each customer or group of customers

After determining the customers or group of customers analysed, the annual revenue is calculated for each segment. How this is done depends on the products or services offered by the company. Consideration should be given to adjustments to the prices of products or services provided to a customer or customer group, to determine the true amount of revenue generated by each customer or the total amount calculated for the customer segment.

Step 3: Use resource consumption accounting to determine the costs attributed to each customer or group of customers

At this stage, the annual cost of each segment (customer or group of customers) is calculated. This will be in two stages:

The first involves determining the costs of the product or service that can be directly attributed to the product, and then to the customer.

Second: Addressing customer costs, including allocation of overhead, marketing, sales and distribution costs.

In both phases, direct and indirect product costs are adopted using RCA, ie excluding idle energy costs. An RCA input is effective in assigning both types of costs to customers. It is also important to determine the gross profit for each customer or group of customers.

At this stage, the gross profit for each customer or group of customers is calculated by subtracting the cost of the goods sold, in accordance with the RCA entry specified in the previous step, from the net revenue for each customer or group of customers specified in the second step. At this stage, net revenues are offset by direct costs only.

Step 4: Analyse the operating profit of each customer to identify profitable, less profitable and non-profit customers

Initially the customer's net revenue identified in step 2 is met with the cost of goods sold to each customer according to the ERP entry in step 3. Next, the operating profit will be analysed by first subtracting the indirect costs identified in step 3 according to the ERP input from the total customer profitability In the previous step to determine the operating profit, and then on the basis of this is rearranged customers or groups of customers according to the level of

profitability to profitable and less profitable and non - profitable. That is because the profitability of customers or customer groups is likely to vary from one year to the next.

Step 5: Develop strategies to maximise customer profitability

After analysing the profitability of customers or groups of customers, and categorisation, this step involves working to develop relationships with customers, based on the results of the analysis. The case factory should work to strengthen relations with profitable customers, to increase revenue and enhance profitability by adopting customer retention policies and enhance customer loyalty, as a priority category in privileges and discounts. Less profitable or non-profit customers can be dealt with in one of two ways:

1. End the relationship with them and stop providing them with products or services - this can be done either by stopping the marketer's production or by raising their prices.
2. Reconsider the contractual relationship with customers, with the aim of converting less profitable or non-profit customers into profitable groups, either by increasing the prices of products or reducing their costs, or both. This can be done by imposing additional fees on purchases of these categories, or transferring some sales or marketing costs from the seller to the buyer such as customer service costs.

Step 6: Periodically review the impact of the proposed mechanism on the profitability of customers

The final step in the proposed mechanism for analysing customer profitability is the need to periodically review the effects of changes made in the previous step, whether in the pricing of products or services, cost reduction or customer services provided after an appropriate period on the profitability of the customer. This step serves as a feedback for the proposed analysis.

Based on the above, the main advantages that the customer profitability analysis can provide, by using the RCA portal, can be identified as follows:

1. Improve profitability by getting rid of unprofitable customers and increasing sales or services to profitable customers.
2. Reach the real costs of each customer or customer segment, excluding non-production costs, which are mainly due to idle energy when determining profitability. Often, especially in Iraq, the costs of idle energy outweigh the real costs of production, which negatively affects the effectiveness of the method of analysing the customer's profitability and usefulness in decision-making.
3. Provide a method for identifying groups of customers who are highly profitable and influential in the overall profitability of the company; a category that deserves to be retained or protected.
4. Improve strategic decision-making, by providing useful information about customer decisions, including pricing, discount and marketing decisions.

Data and Method

The applied study aims to test the possibility of applying the RCA system to the analysis of customer profitability, in one of the industrial companies affiliated to the Ministry of Industry and Minerals (General Company for Rubber and Tire Industries / Babylon Tire Factory). This factory adopts traditional cost allocation methods, based on the volume of production and knowing the advantages to the company which are achieved by the application of this system, compared to the traditional system currently applied. The General Company for Rubber and Tire Industries / Babylon Tire Factory represents the case study for the purposes of this research. It is considered one of the important companies in the field of manufacturing. The main activity of the Company is the production of saloon radial tires, light, heavy and agricultural loads as well as the production of antibiotic rubber. The by-product is the production (sundries, hoses and products in which rubber enters its formation as spare tools (rubber goods)). The Company includes the following factories:

1- Babel tires factory
2- Diwaniya tires factory
3- Rubber products factory.

Table 1 shows the total production costs of the factory for the year ended in 31 December 2017.

Table 1. Total Production Costs

#	Resources	Total Amount (JD)
1	Salaries and wages	19,617,120,000
2	Commodity Supplies	6,718,768,000
3	Service supplies	411,675,000
4	Extras	841,015,000
5	Total cost of manufacture	27,588,578,000
6	Marketing Expenses	54,548,000
7	Administrative expenses	218,190,000
	Production cost	27,861,316,000

The table above shows the total cost of manufacturing tires in the factory for the year 2017 amounting to JD 27,861,316,000. Table 2 shows the cost of each of the factory products.

Table 2. Unit Cost of Products using the Traditional Costing System

#	Products	Tire weight	Unit costs
1	Tire size13/165	6,410	22,231
2	Tire size12/500	7,120	24,693
3	Tire size14/65/185	7,850	27,207
4	Tire size15/65/205	9,075	31,473
5	Tire size15/65/195	9,135	31,681
6	Tire size14/70/195	9,740	33,779
7	Tire size/195 14 C	10,335	35,843
8	Tire size16/650	15,202	52,722
9	Tire size16/750	21,535	74,684
10	tire30-16,9	96,228	333,720

Customer Profitability Analysis under the Traditional Costing System

The application of CPA under the traditional costing system began with scrutiny of the case factory's current customer categories. The factory's customers were identified as following:

Table 3. Customer Categories of the Case Factory

#	Customer name	Customer Code
1	General Company for Southern Fertilizers Industry	A
2	Men's clothing factory in Najaf	B
3	Conquest of Subhi Mohammed	C
4	Complex Marketing / Hilla	D
5	Wasit Textile Factory	E
6	Carpet Factory For Artificial Fibers & Furniture	F
7	Babylon Factory	G
8	Mashreq Sulfur State Company	H
9	Directorate of Internal Departments / University of Babylon	I
10	Babylon Teaching Hospital for Children	J
11	Green Zone Municipality	K
12	Directorate of Hilla Municipality	L
13	Directorate of Mussayab Municipality	M

14	Jameel Judy Reda	N
15	Directorate of Karbala Municipality	O
16	Secretariat of the Great Mosque of Kufa	P

In the case study, factory costs are primarily calculated in cost centres, together with their value (Table 3). These cost centres were: production, staff, stationary, communication, advertising, finance and accounting, human resources, management, energy, storage, purchase, maintenance and repair, food service, and depreciation. Then the costs were apportioned to the corresponding pools cost. The direct costs found by the factory's accountants are specifically assigned to the products. The costs not directly linked to the products at the other hand, are indirectly assigned to the products via cost allocation bases. Then, all categories of products can be attributed to customers based on their purchases during the year of the study.

Table 4. Operational profit or loss of customers under traditional costing system

#	Customer Code	Operational profit or loss for each customer
1	L	3,705,470
2	E	524,000
3	D	318,730
4	N	275,500
5	H	5,000
6	G	(9,750)
7	C	(41,373)
8	I	(119,169)
9	M	(387,120)
10	J	(391,169)
11	F	(836,066)
12	B	(2,832,625)
13	O	(4,735,500)
14	A	(6,482,375)
15	P	(8,208,000)
16	K	(8,397,500)

It is noted from the table above that the factory suffered a loss in most customers of the research sample, due to the cost of the units produced and the cost of salaries and wages in relation to the Ministry of Finance. This calculation resulted in additional costs for the products not directly related to the production units, most of which are due to idle energies in the laboratory, such as labour or indirect industrial costs. Customer L achieved the highest operating profit (**3,705,470**) while customer K achieved the highest operating loss (**8,397,500**). This method of calculation is inaccurate and does not show the required accuracy in the allocation of costs, as the products are loaded at additional costs as well as

inaccurate calculations based on personal estimates of employees. The analysis of customer profitability using the traditional cost approach gives an inaccurate and shaded picture about the plant customers, because this analysis is based on a single cost calculation.

Application the Holistic Approach of CPA

The estimates carried out under the conventional costing model were based on the assumption that the factory's resources were used at full capacity. The holistic approach assumes that the analysis of customer profitability considers the resources employed within the used capacity, and reveals the costs of unused capacity. This analysis begins by identifying customers or customer groups which include 16 customer groups as indicated in table 3. After determining the customers or group of customers, the annual revenue is calculated for each segment. How this is done depends on the products or services offered by the company. To determine the costs that are attributable to each customer or group of customers, RCA is used.

Table 5. Operational profit or loss of the customers under the Holistic approach

#	Customer Code	Operational profit or loss for each customer
1	A	26,268,000
2	B	1,458,410
14	N	464,000
8	H	280,000
13	M	(13,555)
9	I	(13,576)
7	G	(20,370)
6	F	(30,360)
4	D	(61,995)
5	E	(76,500)
10	J	(119,967)
3	C	(250,145)
16	P	(631,500)
12	L	(658,535)
15	O	(820,750)
11	K	(890,000)

The customer's net revenue identified in step 2 was met with the cost of goods sold to each customer according to the ERP entry. Next, the operating profit will be analysed by subtracting the indirect costs determined from the total customer profitability, specified in the previous step to determine the operating profit. Accordingly, customers or customer groups are rearranged according to their level of profitability to profitable, less profitable and unprofitable as shown in Table 5. After analysing the profitability of customers or groups of customers and categorisation, this step is working to develop relationships with customers based on the results of the analysis. The case factory should work to strengthen relations with profitable customers,

to increase revenue and enhance profitability by adopting customer retention policies and enhance customer loyalty as a category priority in privileges and discounts. The results in Table 6 indicate the comparative CPA under the traditional costing system and under the holistic approach.

Table 6. The comparative Profitability Analysis

#	Customer Code	Operational profit or loss under traditional costing system each customer	Operational profit or loss under the holistic approach
1	A	-6,482,375	26,268,000
2	B	-2,832,625	1,458,410
3	C	-41,373	-250,145
4	D	318,730	-61,995
5	E	524,000	-76,500
6	F	-836,066	-30,360
7	G	-9,750	-20,370
8	H	5,000	280,000
9	I	-119,169	-13,576
10	J	-391,169	-119,967
11	K	-8,397,500	-890,000
12	L	3,705,470	-658,535
13	M	-387,120	-13,555
14	N	275,500	464,000
15	O	-4,735,500	-820,750
16	P	-8,208,000	-631,500
Total		(27,611,946)	24,883,158

Table (6) compares operating profit according to the traditional input costs, and then accounting for the consumption of resources. Its comparison reveals that the traditional cost approach characterises most customers as generating losses for the case factory, but RCA shows that a percentage of customers are highly profitable.

Conclusions

Changes in the business environment have increased the level of local and international competition. There is currently rapid technological development, different customer tastes, and other factors that were the main reason for the economic units to provide products with competitive prices that meet customers' needs and desires, gain their satisfaction and loyalty, strive to ensure lower costs, and maintain the quality of products at the highest level. Economic units tend to maintain their position in the market through the adoption of modern methods in

the field of management accounting that will determine the factors of success, and gain competitive advantages in line with developments and changes in the business environment.

Customer profitability analysis is a source of information to assist in strategic decision-making and future plans. This is because the customer is the focus of the success of economic units, and one of the intangible assets for many of them. Accountants in these units must pay great attention to the growing profitability of the customer by analysing this profitability, and knowing how costs and revenues contribute to customers in profits. Traditional cost entry deficiencies in measuring costs are important, and they rely on bases that may be inaccurate or unfair. Also, they do not take into account the costs of idle energy charged to the costs of products or services, which distorts analysis and reduces its importance.

This study sought to provide a holistic model for the analysis of profitability, using resource consumption accounting (RCA) through a proposed approach that includes seven steps. The results show that the proposed model is effective in enhancing the RCA model. In this regard, the study produced valuable information supporting various administrative decisions. First, these results will allow production managers to design cost system strategies more effectively. It offers an analysis of the used and unused energy costs, and how the resource consumption accounting method is adapted to work with the RCA model. This will allow laboratory managers to determine where they need to improve their productivity, and see how these improvements will affect the external value and overall profitability of the plant. The traditional costing system seems an ineffective measurement tool, and it is not enough to analyse profitability. More importantly, it ignores the importance of unused energy cost over the cost of different customers. Furthermore, laboratory managers should remember that tracking the cost of certain activities to customers, using the traditional approach, may not be possible due to the diversity in the use of resources by different customers. Factory managers may wish to install and implement the RCA method in accordance with the model proposed, in subsequent periods, to overcome the constraints of the traditional cost system. If so, all they need is to obtain estimates of the unused and used energy costs for each component of the resources used in production.

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