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Benefits of Switching from Activity-Based Costing to Resource Consumption Accounting: Evidence from a Power Generator Manufacturing Plant

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ABSTRACT

In a globalized and highly competitive business environment, dynamic and precise cost accounting information has become vital for supporting effective planning and decision-making. Traditional accounting systems that provide variable- and fixed-cost information without an adequate view of how resources are being utilized do not provide sufficient information to decision-makers to allow them to streamline the organization's value chain. With the advent of relatively newer accounting systems such as Resource Consumption Accounting, it is now possible for managers to track resource cost flows with pinpoint accuracy. The Resource Consumption Accounting approach is a combination of the German Marginal Cost Accounting and Activity-Based Costing systems that enables the generation of marginal cost statements, which provide precise resource utilization information, and identifies excess or idle capacities of such resources. The current research used a case study of a manufacturing organization based in Southeast Asia with regional presence that used the Activity-Based Costing system for several years and then switched to the Resource Consumption Accounting system. The study demonstrates how the marginal cost statements between Activity-Based Costing and Resource Consumption Accounting differ in the manner in which they present information and how the organization has benefited by identifying the excess resource capacity and tracking resource consumption through Resource Consumption Accounting system.

Keywords: *Resource consumption accounting (RCA), Activity-Based Accounting (ABC), Grenzplankostenrechnung, (GPK).*

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INTRODUCTION

Accounting systems have witnessed significant changes which have been driven by the need for managerial accounting practices to provide more precise information to strategic decision-makers. With the advent of production methods that have emerged due to the rapid changes in systems aligned with phenomena, such as Industry 4.0 (Cotteleer, 2017), cost structures are becoming complex thus requiring dynamism from managerial accounting to keep pace with the developments in other areas of business (Burritt and Christ, 2016).

The result of the realization that the traditional accounting system could not provide sufficient actionable information to managers have led to an emerge of new accounting systems “in vogue” such as Activity Based Costing (ABC) proposed by Cooper and Kaplan (1988), and Grenzplankostenrechnung (GPK) popularly known as the German costing accounting method (Sharman and Vikas, 2004).

While ABC originated in the United States, the Europeans have been more reliant on GPK which was developed to address errors in the distribution of costs to products in order to support managerial decisions (Okutmus, 2015). Given that both of these systems provide more meaningful cost information that can be assigned to the product or service level, they however have significant drawbacks due to their complexity and lack of flexibility (Allain and Laurin, 2018; Gosselin, 2006; Lueg and Storgaard, 2017; Roberts and Silvester, 1996; Sartorius et al., 2007).

As a result, Resource Consumption Accounting (RCA) evolved as a solution that exploits the advantages of both ABC and GPK to provide a more robust and flexible accounting approach (Clinton and Merwe, 2008; Perkins and Stovall, 2011). The basic premise of RCA is that the costs are due to the resources consumed and, therefore, it distributes costs according to resource consumption. The approach brings together ABC-based information with knowledge of resource capacities and connects costs behaviors to input/output linkages at the resource level (Perkins and Stovall, 2011). RCA controls the complexity level of the cost model according to the requirements of the need for information. The RCA model works through the resource pool relations to provide effective measures for the monitoring

and control of operations. In the event of insufficiency of these relations, activity drivers are then added to resource flows to obtain a deeper analysis and more accurate information (White, 2009).

The current study uses a case study approach based on evidence from a manufacturing firm involved in producing small portable power generators. The case was selected to demonstrate how a business organization's decision-making capability changed when they switched their accounting system from ABC to RCA. The study aims to illustrate how budgeting information from both types of accounting approaches enables more effective strategic decision-making.

LITERATURE REVIEW

The following sub-sections describe the ABC and GPK and explain how they combine together to evolve into RCA.

Activity-Based Costing (ABC)

The core concept behind ABC is that organizations consume resources and incur costs to perform an array of activities that are part of their value chain to produce products and services (Al-Hebry and Al-Matari, 2017). Hence, cost allocation should be based on assigning resources to activities either by direct allocation or through resource drivers (Cooper and Kaplan, 1992). Thereafter, the share of the goods and services of the cost of such activities can be computed depending on the number of activity drivers consumed by the goods or services (Cooper and Kaplan, 1988; 1991). The aforementioned authors argue that the approach is not limited to precise cost measurement as it results from the tracking of cost according to cause–effect linkages between resources and final cost purposes. In fact, it also supports the efficiency of production processes through the information generated on how indirect costs impact the overall costs of the production processes. Grasso (2005) suggests that this approach has contributed to the transition from cost measurement to cost management.

Despite the theoretical merits of ABC and the strong assumptions that underlie this approach, the practical application of this system has many inherent challenges. Some of these shortcomings are:

1. The ABC system is quite complex, especially when a deeper analysis of activity levels is needed. This makes the system costly to implement and often, mistakes are made through the misallocation of resources to activities (Puuteman, 2009).
2. Operational processes are constantly being adjusted by organizations due to the dynamics of their business environment, which means certain activities have to be modified, added or excluded. This constant change requires the model to be rebuilt as the activity models keep changing. Therefore, the system requires interviews and surveys to be periodically conducted to reassess costs based on the changed model (Kaplan and Anderson, 2004).
3. Many organizations failed to realize the intended strategic and operational benefits of the system, partly due to its inflexibility. Whatever benefits such organizations were a result of other parallel initiatives, such as continuous process improvement and total quality management (Banker et al., 2008).

In alignment with the above arguments, De La Villarmois and Levant (2009) state that ABC was never able to provide accurate information to sufficiently justify the level of effort and investment needed to implement and maintain such a complex system. Kaplan and Anderson (2004; 2007) took the matter into cognizance and developed an alternative model; the Time-Driven Activity-Based Costing (TDABC), which was successful in mitigating many of the deficiencies of ABC.

The remedy offered by TDABC was through measuring the time required to perform each activity in the value chain of the company for producing and delivering the product or service (Barret, 2005). TDABC allows cost driver rates to be based on the practical capacity of the resources supplied to perform a certain activity (Afonso and Santana, 2016). The activities are derived from process maps, where the demand for resources are expressed in units of time required for each activity instead of tracking costs to activities (Barret, 2005). The objective is to calculate the cost per unit capacity (capacity cost rate) and multiply it by the time taken to perform the activity, where all personnel, material, space and equipment costs are factored in. TDABC eliminates the need to conduct costly re-interviews

and frequent surveys and can be developed through data obtained from business intelligence applied to the existing database or through estimates made by managers where particular activities are performed by estimating the practical capacity of committed resources using a simplified or analytical method (Szychta, 2010).

The discourse presented in the preceding paragraphs indicate that despite the theoretical usefulness of ABC method, the practical implementation of the system is quite challenging and requires continuous investment to update and maintain the system. Therefore, cost management experts have been seeking newer methods that address the shortcomings of ABC.

Planned Marginal Cost Accounting: GPK (Grenzplankosterechnung)

The GPK represents marginal costing that categorizes costs into fixed costs and proportional costs, and also planned costing that forms the basis for cost control of resource pools (Krumwiede, 2005). The concept behind this approach is based on the idea that resources are the real cause of costs. Therefore, in order to allocate costs, organizations need to model and trace resource flow throughout the value chain of the organization. Costs are categorized according to the intrinsic nature of resources and their behavior within the resource pool that are based on the linkages of these costs to the output of these pools. The approach also focuses on the importance of defining each consumption relation based on quantities; although they are not included in determining the consumption relations (Ahmed and Moosa, 2011; Clinton and Webber, 2004b; White, 2009).

The process starts by dividing the organization's value chain into several resource pools, classified based on the nature of their outputs, into production and support centers, where resources are allocated to cost purposes (Portz and Lere, 2009). Thereafter, the costs within each pool are categorized into fixed costs and proportional costs. The fixed costs are labeled as such due to the nature of the resource as it lacks a direct relationship to the outputs of the pool indicated by the unit that drives the cost. Proportional costs, on the other hand, are related to quantitative linkages with the outputs of the resource pools and their allocations are

made based on a standard rate by the theoretical capacity of required resources. Production resource pool costs are also classified (for both fixed and proportional) into: (i) costs arising from the same resource pool, and (ii) costs received from different resource pools (Weaver and Klaassen, 2011). Finally, based on causality and responsiveness, the categorization of costs is made into fixed and proportional costs, and this is dependent on the flow of resources between the resource pools (Clinton and Merwe, 2008).

At first glance, the procedural approach in GPK appears to be similar to ABC. However, the essential difference is that GPK applies the marginal costing principle and only allocates variable cost to products and is geared towards short-term decision-making (Bursal, 1992), whereas, the ABC aims at allocating all the costs required to produce a product and market it in the long run (Hoffjan, 2004). For instance, GPK allocates overhead costs on products through the cost center while ABC does it via activities and processes hence the underlying formal structure of cost pools appear to be similar. Both the management accounting systems stress the issue of cost and profitability control through variance analysis (Kellermanns and Islam, 2004). The difference is that ABC focuses on the process owner's responsibility for the processes across cost centers and departments which is basically a horizontal process compared to GPK which is a vertical one (Krumwiede, 2005).

The classification of costs according to the flow of resources between pools of resources (as fixed or proportional) thus measures operations more accurately and provides a detailed model, which enables managers to easily identify the effects of complexity regarding potential decisions without having to re-model the cost structure (Ahmed and Moosa, 2011). Despite the advantages of the GPK approach, there are several disadvantages:

1. There are inherent difficulties associated with interpreting cost behaviors when considering multiple cost-center outputs and multiple consumers of such outputs without correspondingly large resource consumption relations (Clinton and Webber, 2004b).
2. The feasibility of this approach has been questioned by some due to the lack of homogeneity of resources that may force cost systems to work with many resource pools (Grasso, 2005).

3. It is quite challenging to determine the allocation of rates of fixed costs based on the theoretical capacity of resources (Merwe and Keys, 2002).

Essentially the GPK method focuses on contribution margin, where the margin of each product is obtained by subtracting variable costs from product revenues. The overarching goal of such a method is to support short-term management decisions such as make-or-buy decisions or pricing decisions based on contribution margins rather than product costs. Despite the advantages, the scope of GPK is limited to certain contexts in managerial decision-making. Hence the benefits of both ABC and GPK are brought together under Resource Consumption Accounting.

Resource Consumption Accounting (RCA)

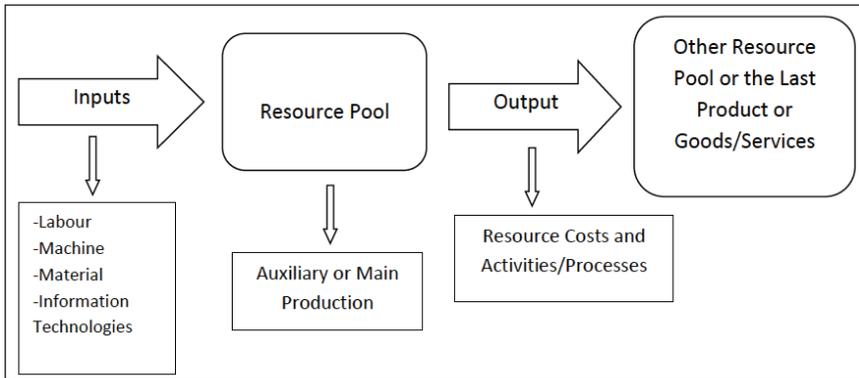
Resource consumption accounting brings together both the ABC and GPK systems resulting in a synergy between the advantages of both systems. Similar to GPK, the RCA approach represents cost behavior by making relevant distinctions between fixed and proportional costs, making it appropriate for decisions that depend on cost behavior information for planning and control (Perkins and Stovall, 2011). The activity-based approach is used only when resource drivers are insufficient or when further information is required regarding resource consumption in resource pools. The activity drivers are also used to determine information on the capacity utilization rates (White, 2009, Wong et al., 2009). A major advantage of RCA is that it allows managers to apply flexible budgeting as a planning and control mechanism at the resource level, enabling decision-makers to isolate variances in quantities and expenses throughout the organization (Ahmed and Moosa, 2011).

Some of the advantages that have emerged in RCA from the combination of GPK and ABC are:

1. The RCA system controls the complexity of the cost model in line with the need for information. The model deploys resource pools relations to deliver effective measures for the monitoring and control of operations. Where there are inadequacies in such relations, activity drivers are then added to resource flows to conduct a deeper analysis and derive more accurate information (White, 2009).

2. The approach also deals with any asymmetry of cost allocation of similar goods and services that consume similar support resources and activities by using the depreciation of the replacement cost for the purpose of preparing internal reports (Ahmed and Moosa, 2011).
3. An important distinction of RCA from the ABC approach is that if an activity is stopped or discontinued, the model can still be deployed without requiring any significant changes to be made (Wong et al., 2009).

The RCA provides a resource-based perspective to management that allows close monitoring of the consumption of these resources and their structures and costs. Furthermore, the system examines the idle capacity and uses replacement costs instead of historical costs. Furthermore, it monitors the cost data at various levels (Peacock and Juras, 2006). The core premise of RCA is that resources are the main causes of all costs, and thus revenues emerge when these resources are directed to specific investments. Figure 1 depicts the RCA model.



Source: White (2009)

Figure 1: Resource Consumption Model

The model in Figure 1 shows the cost-centers vertically and the activities horizontally. In the RCA system, the denominator volume used for cost assignment depends on the manner in which resources are consumed. Fixed cost utilizations are based on resource capacity while proportional costs are allocated based on the budgeted resource output. Therefore, the overhead cost allocations may be distributed vertically through cost centers or horizontally across activities and processes, as is the case in ABC.

RESEARCH METHOD

The method deployed in this research is a qualitative approach conducted primarily through interviews and content analysis of documents provided to the researcher by the organization where the case study was conducted. Financial data was provided to the researcher by the management for the last five years. The documents included financial statements, access to ledger entries and vouchers, and an internal handbook from the accounts department with details of how both the ABC as well as the RCA system was implemented by the firm. Following examination of the documents, the researcher held several interviews with the chief financial officer, accounts manager, internal auditor, and other accounts and finance executives. Finally, an interview was held with the chief executive officer of the company to determine how the two accounting systems impacted the dynamics of the entity's strategic decision-making.

CASE STUDY

The organization that was studied is a manufacturer of small-sized portable power generators for domestic and commercial use. The company started its operations in 2007 with a factory in Peninsular Malaysia. The factory produces two models of generators, Model-A is a larger one with higher capacity and the other (Model-B) is a smaller one with lower capacity.

The company switched from a traditional accounting method to the ABC system in 2013. The objective was to accurately track the cost of producing each product so that they could determine customer profitability based on product types and market segments. However, from 2017, the firm's management decided to switch from ABC to RCA, mainly due to the complexity and high cost of keeping up with the ABC system. Since production planning connected to continuous improvement initiatives requires frequent changes in the production processes, certain activities in the value chain were constantly being discarded and new ones were being added. As a result, the ABC system required frequent information gathering through re-interviews and surveys in order to incorporate the changes. Such practices were becoming cumbersome and costly for the company to maintain.

Application of ABC

The ABC system assign costs based on the product’s demand for cost driving activities. Therefore, the steps required to implement ABC involve:

1. A detailed activity analysis,
2. The accumulation of costs into multiple homogeneous cost pools,
3. The identification of measurable cost drivers that link activities to specific cost objects, and
4. The determination of multiple cost driver rates to assign activity costs to products.

Thereafter, the system relies on the hierarchy of cost driver categories depending on whether they are driven at the unit, batch, product, or facility level. Once costs are assigned to products, they are reported at the unit level. The factory that this case study was based on divided their operations into five activity pools under production services (material handling, pre-production setups, production, and finishing) and one under support services (e.g., human resource, accounts, administrative, security). Table 1 displays all the departmental costs, while Table 2 shows the cost distribution department-wise. The activity cost totals are assigned utilizing a cost driver rate on the basis of the practical capacity and quantity of cost drivers for each product. Table 3 shows the activity cost pools while Table 4 illustrates the company’s budget using the activity-based cost assignments and isolates the budgeted costs of excess (idle) capacity for each activity as the difference between practical capacity and the amount of required capacity to meet the budgeted demand.

Table 1: Cost Information Department-Wise

Department	Support	Materials	Setups	Production	Finishing
Persons (#)	4	3	2	2	12
Salary/person (USD)	\$ 48,000	\$ 48,000	\$ 48,000	\$ 48,000	\$ 48,000
Training (%)	10%	5%	10%	5%	5%
Maintenance (%)				10%	5%
Space (%)	5%	10%	5%	50%	5%
Theoretical or Practical Capacity*	60	80,000	3,600	60,000	48,000
Costs proportional to:	Number of Persons	Number of Parts	Setup Time in Hours	Production Time in Hours	Labor Time in Hours

* Practical capacity is used in Activity-Based Costing (ABC), while theoretical capacity is used in Resource Consumption Accounting (RCA) as the denominator volume for fixed costs. For reducing complexity, both are mentioned together in this case study.

Table 2: Distribution of Support Costs Department-Wise

Department	Support	Materials	Setups	Production	Finishing	Totals
Supplies	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$300,000
Labor Costs	\$192,000	\$144,000	\$96,000	\$96,000	\$576,000	\$1,104,000
Equipment Costs	\$10,000	\$30,000	\$20,000	\$1,600,000	\$40,000	\$1,700,000
Building Costs	\$10,000	\$20,000	\$10,000	\$100,000	\$60,000	\$200,000
Totals	\$272,000	\$254,000	\$186,000	\$1,856,000	\$736,000	\$3,304,000

Table 3: Activity Cost Pools

Department	Materials	Setups	Production	Finishing	Totals
Direct Costs (see Table 2)	\$254,000	\$186,000	\$1,856,000	\$736,000	\$3,032,000
Support Cost: Personnel*	\$42,948	\$28,632	\$28,632	\$171,788	\$272,000
Total	\$296,948	\$214,632	\$1,884,632	\$907,788	\$3,304,000
Cost-Driver Capacity (see Table 1)	80,000 parts	3,600 hours	60,000 hours	48,000 hours	
Cost in \$ per cost- driver	\$3.712/part	\$59.62/hour	\$31.41/hour	\$18.91/hour	

*Personnel cost to the cost pool is based on the head count shown in Table 1. Example of calculation of per/unit or cost per hour is shown below in box.

Example: Materials direct cost = \$254,000/80,000 parts = \$3.712/part
(all data available from Table 1 and 2)

Table 4: Activity-Based Costing (Budget)

Products	Model A (6000 Unit)		Model B (8000 Unit)		Total
	Per Unit	Total	Per Unit	Total	
Sales Price	\$500	\$3,000,000	\$220	\$1,760,000	\$4,760,000
Components	\$60	\$360,000	\$35	\$280,000	\$640,000
Material Handling	\$22.27	\$133,620	\$14.85	\$118,800	\$252,420
Setups	\$11.93	\$71,580	\$5.96	\$47,680	\$119,260
Production	\$62.82	\$376,920	\$125.64	\$1,005,120	\$1,382,040
Finishing	\$94.56	\$567,360	\$18.91	\$151,280	\$718,640
Total Product Cost	\$251.58	\$1,509,480	\$200.36	\$1,602,880	\$3,112,360
Gross Margin	\$248.42	\$745,260	\$19.64	\$78,560	\$1,647,640
Budgeted Excess Capacity					
Materials Handling		6,000 parts x \$3.7119 / part = 22,264			\$22,264
Setups		800 setup hours x \$59.62 = 47,686			\$47,686
Production		8000 production hours x \$31.41 = 251,296			\$251,296
Finishing		5000 finishing hours x \$18.91 = 94,574			\$94,574
Total Cost of Excess					\$415,820
Net Margin					\$1,231,820

Source: All cost and price data were provided by the company

The above cost information can then be transferred to determine the cost assignments for each product. However, for the purpose of the current study, the information generated in the tables above is sufficient, and cost assignments to individual products are not relevant to the objectives of this study.

Application of RCA

For the application of RCA, costs that originate in a resource center are considered as primary costs, while secondary costs are those that are assigned to the resource center from another resource. The total costs are then classified as either fixed costs or proportional costs depending on the cause-and-effect relationships between the input quantities to the output quantities from the resource. It is pertinent to mention that proportional costs at the resource level are not the same as ‘variable costs’, as RCA does not implement the concept of variable costs utilized in traditional accounting practices (White, 2009).

One of the vital issues in the application of RCA is recognizing causal relationships regarding the costs from departments that provide support services and their proper assignment based on the resources consumed. Therefore, the main principle is that of causality relationships in cost assignments. In other accounting approaches, the misallocation of costs can take place, for example, product-B has plastic components which product-A does not. Therefore, the cost of plastic extrusion may be wrongly allocated to product-A in the ABC approach since it is based on activities. However, in the case of RCA, the allocation will be made properly only if there is a clear relationship between the outputs of plastic extrusion and the product. The RCA approach attempts to represent cost behaviors by making a relevant distinction between fixed and proportional costs. Hence, this system is most appropriate for decisions that rely on this cost behavior information for planning and control. Table 5 presents the budgeted proportional costs and fixed costs for the firm’s resource centers, while Table 6 summarizes the budgeted margins for the company based on RCA. The difference between the theoretical and budgeted capacity for each resource is presented as the cost of excess capacity and is not assigned to products.

BENEFITS OF SWITCHING FROM ACTIVITY-BASED COSTING

Table 5: Cost Information based on Resource Cost Centers

Support	Fixed Cost	Proportional Cost	Total
Supplies		\$30,000	\$60,000
Salaries & Wages	\$192,000		\$192,000
Equipment Costs	\$10,000		\$10,000
Building Costs	\$10,000		\$10,000
Total Direct Costs	\$212,000	\$30,000	\$272,000
Cost per Person	\$3,533.33 /person	\$1,578.95/person	\$5,118.28 / person
Materials Handling			
Supplies		\$30,000	\$30,000
Wages & Salaries	\$3,600	\$68,400	\$72,000
Equipment Costs	\$15,000		\$15,000
Building Costs	\$10,000		\$10,000
Total Direct Costs	\$28,600	\$98,400	\$127,000
Portion of Support Cost*	\$43,937	\$98,400	\$142,337
Cost per Part	\$1.0984/part	\$2.8941/part	\$3.9925/part
Setups			
Supplies		\$30,000	\$30,000
Wages & Salaries	\$48,000		\$48,000
Equipment Costs	\$10,000		\$10,000
Building Costs	\$5,000		\$5,000
Total Direct Costs	\$63,000	\$30,000	\$93,000
Portion of Support Cost*	\$10,225		\$10,225
Cost per Hour	\$40.68/hour	\$30/hour	\$70.68/hour
Production			
Supplies		\$30,000	\$30,000
Wages and Salaries	\$48,000		\$48,000
Equipment Costs	\$800,000		\$800,000
Building Costs	\$50,000		\$50,000
Total Direct Costs	\$898,000	\$30,000	\$938,225
Portion of Support Cost*	\$10,225		\$10,225
Cost per Hour	\$30.27/hour	\$1.36/hour	\$31.64/hour
Finishing			
Supplies		\$30,000	\$30,000
Wages & Salaries	\$28,800	\$259,200	\$288,000
Equipment Costs	\$20,000		\$20,000
Building Costs	\$30,000		\$30,000
Total Direct Costs	\$78,800	\$289,200	\$368,000
Portion of Support Cost*	\$61,347		\$61,347
Total Direct Cost	\$140,147	\$289,200	\$429,347
Cost per Hour	\$5.8395/hour	\$15.2211/hour	\$21.0606/hour

*Portion of cost from support is assigned to each resource cost center based on the total hourly rate cost/number of personnel (taken from Table 1). The cost from support is set as a fixed cost within each resource cost center since these costs are not proportional to the output of each cost center.

Table 6: Resource Consumption Accounting (Budget)

	PRODUCT-A (6000 units)		PRODUCT-B (8000 units)		
	Per Unit	Total	Per Unit	Total	Totals
Sales Price	\$500/unit	\$3,000,000	\$220/unit	\$1,760,000	\$4,760,000
Proportionate Costs*					
Components	\$60/unit	\$360,000	\$35/unit	\$280,000	\$640,000
Material Handling	\$17.37	\$104,220	\$11.58	\$92,640	\$196,860
Setups	\$6.00	\$36,000	\$3.00	\$24,000	\$60,000
Production	\$2.73	\$16,400	\$5.45	\$43,600	\$60,000
Finishing	\$76.11	\$456,660	\$15.22	\$121,760	\$578,420
Total Proportionate Costs	\$162.20/unit	\$973,200	\$70.25/unit	\$562,000	\$1,535,200
Contribution Margin		\$2,026,800		\$1,198,000	\$3,224,800
Fixed Costs**					
Material Handling		\$39,542		\$35,148	\$74,690
Setups		\$48,816		\$32,544	\$81,360
Production		\$445,171		\$920,466	\$1,265,637
Finishing		\$175,184		\$46,716	\$221,900
Total Fixed Costs		\$699,992		\$943,595	\$1,643,587
Gross Margin		\$1,326,808		\$254,405	\$1,581,213
Budgeted Cost of Excess (Idle) Capacity***					
Support Services	Personnel Costs: \$3,533.33/person x 11 persons = 38,867				\$38,867
Materials Handling	\$1.0984/part x 6,000 parts = 6,590				\$6,590
Setup	\$40.6803/hour x 800 hours = 32,544				\$32,544
Production	\$30.2742/hour x 800 hours = 242,194				\$242,194
Finishing	\$5.8395/hour x 5000 hours = 29,198				\$29,198
Total Cost of Excess					\$349,393
Net Margin					\$1,231,820

*Proportional costs are assigned to each product based on (the proportional cost per resource output) × (the budgeted amount of resource output for each product).

**Fixed costs are assigned to products only when causality is determined. Hence, fixed costs are assigned to each product based on (fixed cost per resource output) × (the budgeted amount of resource output for each product).

***Budgeted costs of the excess capacity are based on: (fixed cost per unit of resource output) × (the difference between theoretical and budgeted capacities for each resource). RCA identifies the excess capacity at the resource level; therefore, secondary costs (e.g., support services) may be included. The cost of excess or idle capacity is never assigned to products.

DISCUSSION

The organization used in this case study realized the following benefits from implementing the RCA system:

1. They were effectively able to attribute costs to specific work centers in their production value chain. As a result, the outputs indicated more accurate cost assignments and enabled management to better understand resource consumption patterns.

2. Only relevant costs were assigned to conduct resource planning. The management can obtain a clear idea about the marginal contribution of each product.
3. The problem of unequal cost assignment for similar products that consumed the same resources and support services was mitigated because a replacement cost depreciation approach was used.
4. Only the cost of the resources used was included in determining product costs.
5. Based on unconsumed theoretical capacity, the quantity of excess (idle) capacity was available to the decision-makers.
6. Previously, the company had to assign costs based on unrelated changes to other products; however, RCA enabled such costs to be assigned only based on causality.
7. The ability of managers to understand the resource inter-relationships and to use the relationships to support incremental decision-making was facilitated by accurately identifying the resource consumption based on the intrinsic nature of particular costs.

From a strategic planning perspective, a crucial benefit to the organization from adopting RCA was the introduction of variance analysis that enabled decision-makers to visualize the changes in capacity utilization (i.e., volume variances) at the resource level. The marginal statement discloses the difference between the theoretical and budgeted capacity for each resource as the expected cost of the excess resource capacity. Therefore, management could monitor the reported amount of excess capacity at the resource level to identify those resources that represent potential bottlenecks to the system due to capacity shortfalls or represent opportunities for cost savings by eliminating resource capacities that exceed foreseeable requirements.

The transition from a traditional accounting system to the ABC system, and then to RCA, for the company, entailed substantial effort, disruptions, and costs for the organization. However, the four years that the company

used the ABC approach enabled them to rapidly transfer to the resource consumption system with some short-term training of the managers and personnel in the accounting department.

Limitations and Future Research Directions

The resource consumption accounting method was developed to combine the resource view advantages of the GPK with the process view advantages of ABC. Hence, RCA enables managers to optimize business operations for success based on operational data by visualizing productive capacity in conjunction with their competitive strategy. The original proponent of RCA (who is also the developer of the SAP control module) designed the system for implementation in all business sectors including manufacturing and service (Ahmed and Moosa, 2011). However, the excessive use of RCA is limited to production of tangible goods, and in fact the academic literature indicates that most of the case studies are based on manufacturing (White, 2009). A possible explanation for this is that over 3,000 companies involved in manufacturing in German speaking countries are using the GPK system for operational decision-making purposes. Therefore, future researchers are encouraged to develop more case studies with application of RCA in the service sector.

Another observation from the scant amount of academic literature available on RCA is that most of the case studies are presented on simple production operations. In circumstances where the operational activities are more complex have been overlooked by academic research. The causal relationships in complex operations will be more revealing in terms of effectiveness of RCA in such contexts. Future studies on complex production systems will be useful to the body of knowledge in this stream of research.

Finally, this study is difficult to generalize mainly because the application of the system needs to be studied across geographical borders and across different cultures. Unfortunately, despite the recognition given to RCA by the International Federation of Accountants (Al-Rawi and Al-Hafiz, 2018), the system is not in vogue in most economies, thus limiting the scope of the research. This poses opportunities for future researchers to undertake experimental studies in collaboration with willing companies to study how RCA improves real-time managerial decision-making capabilities of organizations.

CONCLUSIONS

In today's competitive business market, it's crucial for companies to use their resources in the most effective and efficient way possible while not allowing their cost to cross the limit margin. Henceforth, RCA has emerged to allow for effective cost and resource management. The objective of RCA is to produce marginal profit and loss statements that clearly show the nature and characteristics of several contribution margins. Costs are assigned to the level of the organization responsible for avoiding the costs. Costs can be assigned at the individual product or service level, product or service level group or line, or to the entire organization. This allows supervisors of a resource center to increase efficiencies by creating excess capacity so that such supervisors can be rewarded for creating efficiencies and not for non-productive work to cover up for the excess capacity. The principle of causality and responsiveness allows operational resource flows to be turned into avoidable and unavoidable costs for effective decision-making that supports enterprise optimization.

RCA tracks the nature of costs in organizations (both fixed and proportional) and shows how this nature changes to provide highly relevant information regarding marginal and incremental cost analysis. RCA can provide detailed variance analysis for cost control and visibility and allows planning of cost targets without distortions, even when there are fluctuations in volume. RCA supports product costing and other costing such as customer or distribution channels to enable profitability analysis, provides superior information on capacity use, and correctly handles excess capacity costs.

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