Recognition of Idle Resources in Time-Driven Activity-Based Costing and Resource Consumption Accounting Models

Michael S.C. Tse*
Maleen Z. Gong**

Abstract

Despite its theoretical superiority over traditional volume-based costing models, the Activity-Based Costing (ABC) modelhas failed to replace traditional volume-based costing models in most organisations. In response to the problems of the model, Time-Driven Activity-Based Costing (TDABC) and Resource Consumption Accounting (RCA) models have been developed as costing models for next generation cost management systems. A key feature that distinguishes TDABC and RCA models from traditional volume-based costing models and the ABC model is the recognition of idle resources in resource pools.

This paper presents a discussion on implications of recognising idle resources in TDABC and RCA models on developments, maintenance and uses of cost management systems. A hypothetical case is presented to illustrate conversions of an ABC-based costing model to ones that are based on the TDABC and RCA models, and the resulting new allocation of resource costs.

Keywords

Cost Management
Idle Resources
Activity-Based Costing
Time-Driven Activity-Based Costing
Resource Consumption Accounting

*Deakin University
**Monash University

Introduction

Designing and maintaining effective cost management systems is a fundamental task for management accountants. In recent decades, advances in information technology have brought significant improvements to the collection and communication of cost data in organisations. Unfortunately, traditional volume-based costing models (absorption costing and variable costing) do not make good use of available data. These costing models are based on simplified assumptions of cost behaviour, and are designed to cope with limited availability of data (Cooper and Kaplan, 1988). They work well when organisations operate in a stable environment with low variability in outputs. As the complexity of an organisation's operations increases, weaknesses of these costing models become more evident (Cooper, 1987; Drury, 1990).

The Rise and Fall of ABC

A major initiative to address weaknesses of traditional volume-based costing models is the introduction of the activity-based costing (ABC) model. By allocating resource costs to cost objects through multiple activities performed at different levels within an organisation, ABC-based cost management systems effectively avoid product cost cross-subsidisation between high-volume, low-complexity organisational outputs and low-volume, high-complexity organisational outputs (Cooper and Kaplan, 1988; Cohen et al., 2005).

Despite its theoretical superiority over traditional volume-based costing models, the ABC model has failed to replace volume-based costing models in most organisations. The adoption rate of the ABC model in business organisations is disappointingly low and the vast majority of ABC implementations did not sustain in the long run (Gosselin, 1997; Chenhall and Langfield-Smith, 1998; Innes et al., 2000; Cotton et al., 2003; Kiani and Sangeladji, 2003; Byme et al., 2009).

Commonly cited reasons of failure in ABC implementation projects included: (i) high time and resources commitments (Innes et al., 2000; Kaplan and Anderson, 2004; Cohen et al.,

2005); (ii) lack of integration between ABC-based cost management systems and other parts of organisational information systems (Sharman, 2003); (iii) complexities of maintaining ABC-based cost management systems in large organisations (Kaplan and Anderson, 2004; Pernot et al., 2007); and (iv) lack of management support (Kiani and Sangeladji, 2003; Cohen et al., 2005; Kaplan and Anderson, 2007).

Many organisations elect not to fully implement the ABC-based cost management system after performing analyses of organisational activities. Instead they use the information gathered from the analyses to improve their existing systems (Gosselin, 1997; Baird et al., 2004). Implementation of the ABC model requires an organisation to analyse links between organisational activities and organisational outputs. The analysis enables management to understand values of organisational activities and to eliminate activities that do not add value (Gosselin, 1997). As such, the analysis is beneficial to the organisation even when an ABC-based cost management system is not subsequently implemented.

The New Contesters

As the ABC model has failed to provide a cost-effective and sustainable cost management solution to most organisations, a new search for cost management solutions started again in the mid-1990s. Consequently, two new costing models, *Time-Driven Activity-Based Costing (TDABC) and Resource Consumption Accounting (RCA)*, emerge as two contenders of costing models for next generation cost management systems. TDABC and RCA models have been designed to address the shortcomings of the ABC model but strategies adopted by the two models in achieving their objectives are very different.

The TDABC model is a variant of the ABC model which is specifically designed to simplify implementation and maintenance of cost management systems (Kaplan and Anderson, 2004; 2007). The model is designed to address difficulties faced by management in implementing ABC-based cost management systems through the removal of activity pools and instead uses of quantity-based resource-activity cost drivers in the model. It is argued that the TDABC-based cost management system can provide more accurate cost information whilst removing the need of performing costly and time-consuming employee surveys to maintain the costing model (Kaplan and Anderson, 2004; Barrett, 2005).

The RCA model has been developed as a costing model for use with comprehensive computer-based cost management systems. It combines the features of the ABC model and German costing models (Keys and van der Merwe, 2001; Clinton and Keys, 2002). Since the end of the Second World War, German academics and practitioners have developed several costing models like Grenzplankostenrechnung (GPK), and Relative Einzelkosten- und Deckungsbeitragsrechnung (Schildbach, 1997; Weber and Weibenberger, 1997). These models have strong ties to German social and legal environments and are more complex than those of their English-speaking counterparts (Baetge et al, 1995; Kaplan and Atkinson, 1998; Friedl et al., 2005; Krumwiede and Suessmair, 2007).

The RCA model combines features of German costing models such as resources-focused cost management and quantity-based cost modelling with the activity-based paradigm and can be viewed as an evolution of the ABC model in Enterprise Resource Planning (ERP) systems (Clinton and Keys, 2002; van der Merwe and Keys, 2002). Unlike the TDABC model, the RCA model is not designed to reduce complexity of cost management system. Instead it relies on integration with ERP systems to overcome the complexity problem (Webber and Clinton, 2004).

A common feature of the TDABC and RCA models that distinguish these two models from traditional volume-based costing models and also the ABC model is the recognition of idle resources in resource pools. Both models acknowledge the fact that part of the committed resources may not be utilised in organisations' normal course of business and remain idle. Therefore resource costs are allocated to cost objects only when resources are actually consumed. All resource costs associated with idle resources remain in

resource pools rather than being allocated to cost objects.

The objective of this paper is to discuss implications of recognising idle resources in TDABC and RCA models on the development, maintenance and use of cost management systems. The remainder of this paper is organised as follows. The second section examines how recognition of idle resources distinguish TDABC and RCA models from traditional volume-based costing models and the ABC model; especially the implications of recognising idle resources in the two models. The third section uses a hypothetical case to illustrate conversions of an ABC-based costing model to ones that are based on the TDABC and RCA models; and applies these new costing models in the allocation of resource costs. A conclusion is then drawn in the fourth section.

Implications of Recognising Idle Resources in TDABC and RCA Models

Under traditional volume-based costing models and the ABC model, allocation of resource costs is based on the assumption that all committed resources are fully utilised in an organisation's operations. Therefore, resource costs are allocated to cost pools in full; and resource capacity is employed as a denominator in the calculation of monetary values allocated to cost pools.

The assumption of a full utilisation of resources can be true for physical resources like materials, but is highly unlikely the case for intangible resources such as IT services. TDABC and RCA models acknowledge the fact that idle resources may exist in an organisation's normal course of business as committed resources may not be fully utilised. Therefore, the two models attach resource costs to individual units of a resource. Resource costs are allocated to a cost pool only when resources are actually consumed by that cost pool. Resources that are not utilised in operations (idle resources) are recognised in the two models and costs associated with idle resources are not allocated to any cost pool.

Recognition of idle resources in TDABC and RCA models represent a different view on the nature of product cost. By assuming full utilisation of resources in operations, traditional volume-based costing models and the ABC model recognise all costs of committed resources as product costs. Any difference between total committed resource costs and allocated resource costs is regarded as an error of the allocation process and adjustments are subsequently made to eliminate the difference. In contrast, calculation of product costs in TDABC and RCA models is based on quantities of resources consumed in operations rather than quantities of committed resources. Resource costs that are attributable to consumed resources are treated as product costs while idle resource costs are treated as period costs.

Both TDABC and RCA models allocate resource costs in accordance to quantities of resources allocated to cost pools but drivers of resources allocation in the two models are different. In the TDABC model, allocations of resource costs are driven by levels of activities which in turn are driven by levels of output. In contrast, allocation of resource costs is driven by recorded usages of resources in the RCA model (McNair, 2007). Unlike levels of activities, recorded usages of resources do not necessarily have relationships with levels of output. Consequently, users of the RCA-based cost management systems are more likely to manage idle resources through controlling levels of committed resources as effects of changes in outputs on quantities of idle resources are weaker than effects of changes in levels of committed resources on quantities of idle resources under the RCA model.

Recognition of idle resources in the TDABC and RCA models facilitate developments and maintenance of cost management systems through simplifying resource costs analysis. In addition, cost management systems that adopt the two models can provide information on idle resources for decision making (Buchheit, 2003; 2004). The implications of simplifying resource cost analysis and providing idle resources information on organisations are discussed next.

Simplification of Resource Costs Analysis

Recognition of idle resources in the TDABC and RCA models makes modifications of organisational costing model simpler by changing the way that resource costs analysis is performed. Analysis of cost flows from resource pools to cost pools is an important task in the development and maintenance of cost management systems. Under traditional volume-based costing models and the ABC model, the sum of resources consumed by all cost pools linked to a resource pool is assumed to be equal to all committed resources in the resource pool. All cost pools linked to a resource pool are analysed collectively and the objective of resource cost analysis is to determine the percentages of resources consumed by a group of cost pools that are linked to the resource pool. Modification of costing model is time-consuming, as any change in a cost pool cannot be made without influencing allocation of resources in all resource pools that are linked to the cost pool. The problem is more serious under ABC-based costing models as they tend to have more resource pools and activity pools than costing models that are based on traditional volume-based costing models.

TDABC and RCA models simplify resource cost analysis by changing from collective resource cost analysis to individual resource cost analysis. Under the two models, the assumption of equality of available resources and consumed resources does not hold as existence of idle resources (difference between available resources and consumed resources) is allowed in the two models. The absence of this assumption removes the need of collective resource cost analysis. Quantities of resources consumed by cost pools are individually determined in the resource cost analysis and the objective of resource cost analysis is to determine quantity-based resource cost allocation rates based on multiple one-to-one relationships between resource pools and cost pools. Through individual resource cost analysis, cost pools can be added to or removed from a costing model without making any change in other cost pools. Thus the modification of an organisational costing model is much simpler, as change in one resource cost allocation rate has no impact on other resource cost allocation rates.

Collective analysis of cost pools in the traditional volume-based costing models and the ABC model enables management to conceal idle resources in a resource pool by adjusting percentages of resource cost allocated to cost pools to ensure the total percentages add up to 100 percent (Kaplan and Anderson, 2004). In contrast, management cannot conceal quantities of idle resources in individual resource cost analysis by manipulating resource cost allocation rates. The concealment is prevented because the quantity of idle resources in a resource pool is determined by collective effects of all resource cost allocation rates that are linked to the resource pool. Effects of individual resource cost allocation rates to the allocation of resources in a resource pool are crystallised after the cost allocation process is performed, and are unknown to management when individual resource cost analyses are performed. The change from collective resource cost analysis to individual resource cost analysis in TDABC and RCA models not only simplifies modifications of costing models but also ensures costs of idle resources to remain visible.

Provision of Information on Idle Resources

Cost management systems, like all other management accounting systems, are economic goods (Horngren, 2004). The decision to deploy a cost management system is an economic decision which is made on the basis of the cost of developing and maintaining the system; and benefits of operating the system.

A key benefit that an organisation can obtain from operating a cost management system is the ability to provide information for decision making (Sprinkle, 2003; Anderson, 2007). Types of information that a cost management system can provide depends on the costing model it adopts. Through the adoption of the TDABC and RCA models, cost management systems can provide three types of information for decision making, namely (1) costs allocated to cost objects; (2) links between resource pools and cost pools and; (3) quantities of idle resources and their associated costs.

Information of costs allocated to cost objects (type 1 information) enables management to

manage product costs by changing quantities of organisational outputs. Under traditional volume-based costing models and the ABC model, costs associated with idle resources are allocated to cost objects. Product costs are inflated and management may accidentally start the fixed cost death spiral by removing products or services that consume fewer resources than they appear to consume (van de Merwe and Keys, 2001). By removing impacts of idle resources on product costs, TDABC and RCA models enable cost management systems to provide more accurate information on product costs (Benjamin and Simon, 2003; Kaplan and Anderson, 2004).

The ABC model differentiates itself from traditional volume-based costing models by enabling cost management systems to provide information on how operating activities add value to organisational outputs through linkages between resource pools and cost pools (type 2 information). With this type of information, management can reduce product costs by reducing or eliminating non value-added activities (Gosselin, 1997). As both the TDABC and RCA models adopt activity-based paradigm in the models, cost management systems that are based on the two models can also provide information on linkages between resource pools and cost pools.

While adoption of the ABC model enables management to eliminate non value-added activities by using information on how operating activities add value to organisational outputs, it provides little insights on how value-added activities can be managed. In the TDABC and RCA models, provision of information on idle resources effectively fills this gap.

As idle resources do not make direct contributions to operating activities, their existence represents inefficiencies in an organisation's operations. Management can improve operational efficiency by reducing quantities of idle resources. Idle resources can be reduced by either increasing organisational outputs or reducing quantities of committed resources (Buchheit, 2003). By providing information on idle resources in resource pools, TDABC and RCA models enable management to improve an organisation's efficiency in performing its value-added activities.

Table 1: Comparison of TDABC and RCA models

	Time-Driven Activity Based Costing	**Resource Consumption Accounting**
Relationship with other information systems	System independent	ERP-compliant
Organisation of resource pools	Cost-based resource pools	Technology-based resource pools
Composition of resource pools	All resource costs are variable	Resource costs can be either fixed or variable
Cross-allocation of resource costs among resource pools	No cross allocation among resource pools	Cross allocation among resource pools is allowed
Allocation of resource costs to cost objects	Activity-based cost allocation	Both activity-based and volume-based cost allocation are allowed

TDABC and RCA Models in Action – Department M

Department M

In this section, an ABC-based costing model for a hypothetical production department is converted to two costing models that are based on the TDABC model and the RCA model respectively. The two new costing models are then used to allocate resource costs to its products.

Department M is a hypothetical production department in a manufacturing firm. It is an autonomous organisational unit that involves in production of three products, namely standard, deluxe and premium.

Figure 1: ABC-Based Costing Model for Department M

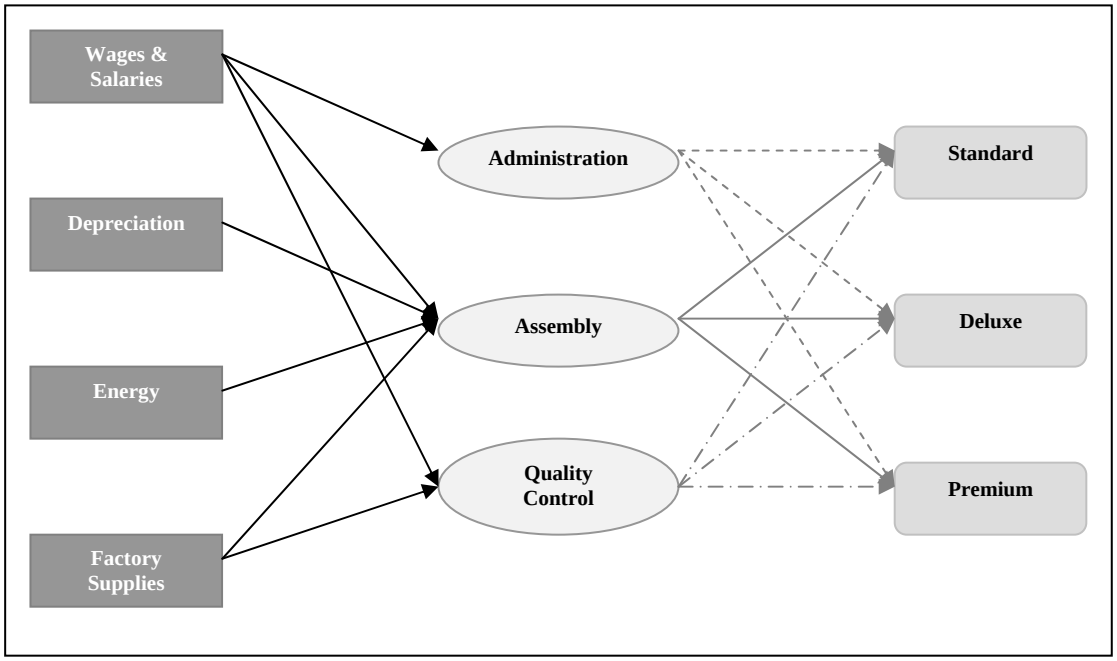


Figure 1 presents an ABC-based costing model for allocation of resource costs in department M. Four resource pools, *namely wages and salaries, depreciation, energy and factory supplies* are identified in the model. Resource costs for the current accounting period are presented in Table 2.

The four resource pools are linked to three activity pools: *administration, assembly and quality control*. Administration is a facility-level activity that bears no relationship with output levels while assembly and quality control are unit-level and batch-level activities respectively. After allocating resource costs to the three activity pools, activities costs are subsequently allocated to three cost objects (product lines): standard, deluxe and premium. Quantities of resource drivers and activity drivers for the current accounting period are presented in tables 3 and 4 and outcomes of the allocation process are presented in table 5 and 6.

Table 2: Resource Costs and Resource Drivers

Resource	Cost	Resource Driver
Wages and Salaries	$100,000	Labour Hour
Depreciation	$150,000	Square Metre
Energy	$20,000	Kilowatt
Factory Supplies	$7,500	Kilogram

Table 3: Quantities of Resource Drivers

Resource Driver	Administration	Assembly	Quality Control
Labour Hour	2,500	7,000	500
Square Metre		2,000	
Kilowatt		30,000	
Kilogram		6,000	1,500

Table 4: Activity Drivers

Activity	Activity Driver	Standard	Deluxe	Premium
Administration	Product Line	1	1	1
Assembly	Unit of Production	2,200	1,000	300
Quality Control	Inspection	88	100	60

Table 5: Allocation of Resource Costs to Activities – ABC-Based Costing Model

Resource	Administration	Assembly	Quality Control
Wages and Salaries	$25,000.00	$70,000.00	$5,000.00
Depreciation		$150,000.00	
Energy		$20,000.00	
Factory Supplies		$6,000.00	$1,500.00
Total	$25,000.00	$246,000.00	$6,500.00

Table 6: Allocation of Activity Costs to Product Lines – ABC-Based Costing Model

Activity	Cost per Activity Driver	Standard	Deluxe	Premium
Administration	$8,333.33	$8,333.34	$8,333.33	$8,333.33
Assembly	$70.29	$154,628.57	$70,285.71	$21,085.71
Quality Control	$26.21	$2,306.45	$2,620.97	$1,572.58
Total		$165,268.36	$81,240.02	$30,991.62

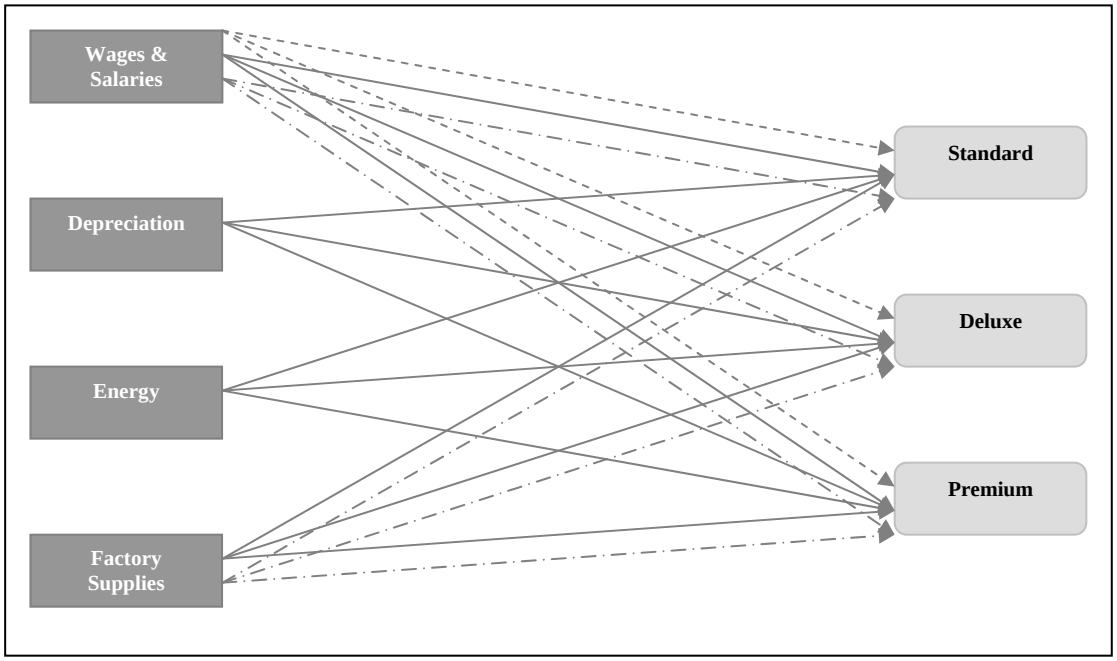
From ABC to TDABC

Conversion of an ABC-based costing model to a TDABC-based one is relatively simple. Relationships between resource pools, activities and cost objects identified in the ABC-based costing model can be adopted in TDABC-based model directly and information provided by ABC-based cost management system can be used to derive the resource-activity drivers.

Figure 2 presents a TDABC-based costing model for Department M. In the first glance, the new TDABC-based model does not look much different from the ABC-based model. The two models have same resource cost pools, same activities and same cost objects. However, under the TDABC-based model, there is no activity pool in the model. Resource pools are linked to cost objects directly through resource-activity cost drivers (Kaplan and Anderson, 2004; Barrett, 2005). Each resource-activity cost driver represents an independent link between a resource pool and a cost object that consume a particular activity. In Department M's case, each resource pool is linked to one to three resource-activity cost drivers. The number of resource-activity cost driver between a resource pool and a cost object depends on the number of activities that consume the same resource. For instance, the wages and salaries cost is consumed by all of three activities (administration, assembly and quality control). Therefore, the wages and salaries cost is linked to all cost objects through three separate resource-activity cost drivers. In contrast, the energy cost is only linked to cost objects through one resource-activity driver as the energy cost is consumed by the assembly activity only. The value of a resource-activity cost driver is calculated by multiplying resource costs per hour and number of hours for an activity (Kaplan and Anderson, 2004; 2007). Table 7 presents the information on resource costs per hour for each resource. For depreciation, the level of capacity (7,200 hours) is determined by the level of capacity of the resource that serves the same activity (i.e. energy).

Table 8 presents the information on time spent on each activity. The administration activity is a facility-level activity and each product line is assumed to consume same amount of administration cost. As such, the number of hours spent on each product line is equal to the total number of hours spent on administration activities (2,550 hours) divided by number of product lines and the resource-activity driver for allocating wages and salaries cost (the only resource cost for the administrative activity) to each product line is equal to the wages and salaries cost per hour cost multiplies the number of hours spent on each product line.

Figure 2: TDABC-Based Costing Model for Department M



.

Table 7: Resource Costs per Hour

Resource	Capacity (hours)	Cost per Hour
Wages and Salaries	10,000	$10.00
Depreciation	7,200	$20.83
Energy	7,200	$2.78
Factory Supplies	7,500	$1.00

Table 8: Activity Times

Activity	Level	Unit of Activity	Product Line	Time per Unit (hours)	Number of Units	Total Time (hours)
Administration	Facility	Product Line	-	850	3	2,550
Assembly	Unit	Unit of Production	Standard	1.8	2,200	3,960
			Deluxe	2.2	1,000	2,200
			Premium	3.0	300	900
Quality control	Batch	Inspection	Standard	0.5	88	44
			Deluxe	0.5	100	50
			Premium	1.0	60	60
Total						9,764

In comparison, assembly activity is a unit-level activity and the unit of activity is the number of units in each product line. As amounts of time used to produce a unit in each product line differs, each resource-activity driver for allocation of a resource cost to a particular product line has a different value. Each of them is equal to the per hour cost of that resource multiplied by the number of hours spent on producing a unit in a particular product line.

Quality control activity, as a batch-level activity, uses the number of inspections as units of activity. A resource-activity driver for each product line is equal to the per hour cost of a resource multiplied by the number of hours spent on an inspection.

After determining values of all resource-activity drivers, the resource costs are allocated to the three product lines. The outcomes of the allocations of resource costs are presented in

Tables 9-14. As shown in Table 14, not all committed resource costs are allocated to the product lines. The difference between a resource cost and the total resource cost allocated to the three product lines is the cost of idle resources.

Table 9: Allocation of Wages and Salaries Cost to Product Lines – TDABC-Based Costing Model

Product Line	Activity	Resource-Activity Driver	Unit of Activity	Cost Allocated
Standard	Administration	$8,500.00	1	$8,500.00
	Assembly	$18.00	2,200	$39,600.00
	Quality control	$5.00	88	$440.00
Deluxe	Administration	$8,500.00	1	$8,500.00
	Assembly	$22.00	1,000	$22,000.00
	Quality control	$5.00	100	$500.00
Premium	Administration	$8,500.00	1	$8,500.00
	Assembly	$30.00	300	$9,000.00
	Quality control	$10.00	60	$600.00
Total				$97,640.00

Table 10: Allocation of Depreciation Cost to Product Lines – TDABC-Based Costing Model

Product Line	Activity	Resource-Activity Driver	Unit of Activity	Cost Allocated
Standard	Assembly	$37.50	2,200	$82,500.00
Deluxe	Assembly	$45.83	1,000	$45,833.33
Premium	Assembly	$62.50	300	$18,750.00
Total				$147,083.33

Table 11: Allocation of Energy Cost to Product Lines – TDABC-Based Costing Model

Product Line	Activity	Resource-Activity Driver	Unit of Activity	Cost Allocated
Standard	Assembly	$5.00	2,200	$11,000.00
Deluxe	Assembly	$6.11	1,000	$6,111.11
Premium	Assembly	$8.33	300	$2,500.00
Total				$19,611.11

Table 12: Allocation of Factory Supplies Cost to Product Lines – TDABC-Based Costing Model

Product Line	Activity	Resource-Activity Driver	Unit of Activity	Cost Allocated
Standard	Assembly	$1.80	2,200	$3,960.00
	Quality control	$0.50	88	$44.00
Deluxe	Assembly	$2.20	1,000	$2,200.00
	Quality control	$0.50	100	$50.00
Premium	Assembly	$3.00	300	$900.00
	Quality control	$1.00	60	$60.00
Total				$7,214.00

Table 13: Total Costs Allocated to Product Lines – TDABC-Based Costing Model

	Standard	Deluxe	Premium
Administration	$8,500.00	$8,500.00	$8,500.00
Assembly	$137,060.00	$76,144.44	$31,150.00
Quality Control	$484.00	$550.00	$660.00
Total	$146,044.00	$85,194.44	$40,310.00

Table 14: Summary of Resource Costs Allocation – TDABC-Based Costing Model

Resource	Committed Cost	Allocated Cost	Cost of Idle Resource
Wages and Salaries	$100,000.00	$97,640.00	$2,360.00
Depreciation	$150,000.00	$147,083.33	$2,916.67
Energy	$20,000.00	$19,611.11	$388.89
Factory Supplies	$7,500.00	$7,214.00	$286.00

From ABC to RCA

Unlike the ABC and TDABC models, the RCA model allows for the separation of fixed and variable components in cost pools and the concurrent use of both activity-based and volume-based cost allocation methods (van der Merwe and Keys, 2001; 2002). Therefore, the allocations of RCA-based costing models are likely to be significantly different from those based on other costing models. To convert an ABC-based costing model to a RCA-based one, additional information on organisational resources and cost behaviour of all resources must be collected before the conversion process begins. Tables 15 and 16 present the additional information collected for the development of an RCA-based costing model.

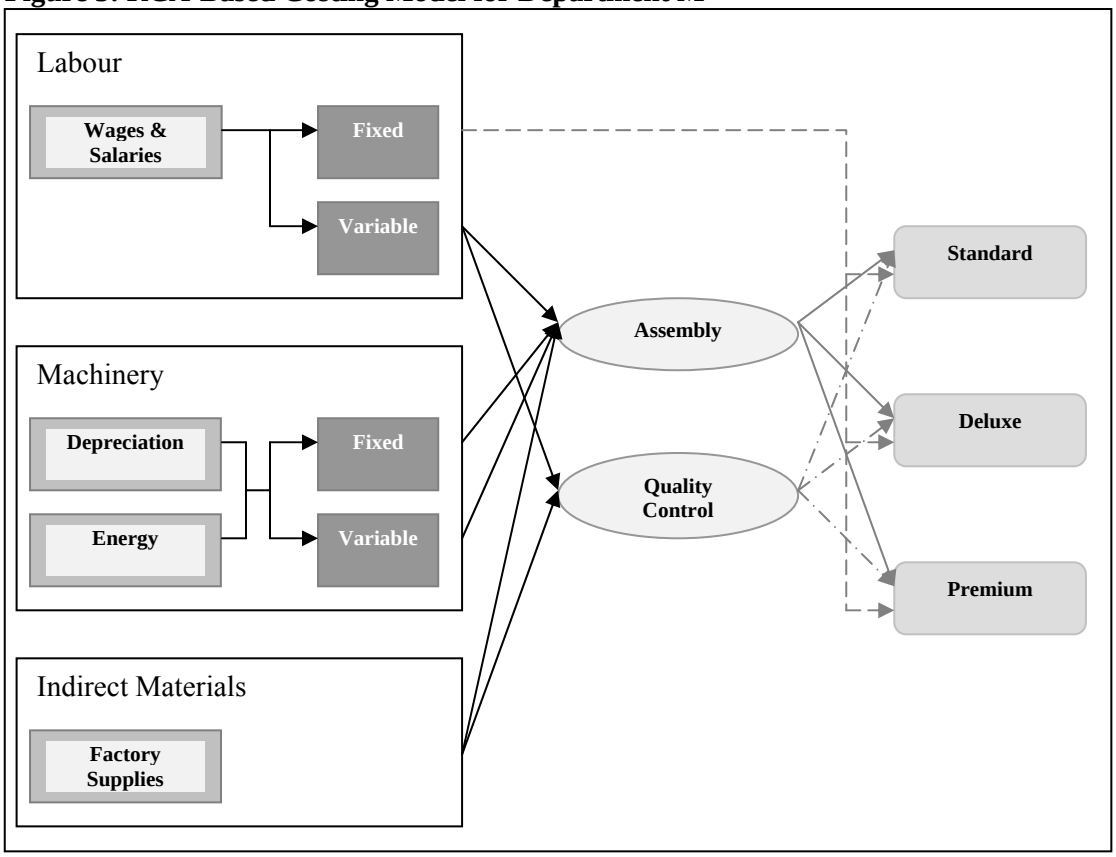
Table 15: Resource Pools

Resource Pool	Fixed Cost	Variable Cost	Unit	Unit Cost
Labour	$30,000.00	$70,000.00	Labour Hour	$9
Machinery	$102,000.00	$68,000.00	Machine Hour	$8.5
Indirect Materials	N/A	$7,500.00	Kilogram	$1

Table 16: Consumptions of Resources

Resource Pool	Assembly	Quality Control
Labour	7,060	154
Machinery	7,100	
Indirect Materials	7,000	496

Figure 3: RCA-Based Costing Model for Department M



The RCA-based costing model for Department M is presented in Figure 3. Under the new model, three resource pools, namely labour, machinery and indirect materials are identified. The division of resource pools is based on the technologies employed by the resources

(Clinton and Keys, 2002; Clinton and Webber, 2004). Depreciation and energy are combined into a machinery resource pool while wages and salaries and factory supplies are re-named as labour and indirect materials respectively. Unlike the ABC and TDABC models, a resource pool in a RCA-based costing model can have fixed and variable components at the same time (van der Merwe and Keys, 2001; Benjamin and Simon, 2003; Krumwiede and Suessmair, 2007). In Department M's case, labour and machinery resource pools consist of both fixed and variable components while the indirect materials resource pool has variable component only.

The fixed component of the labour resource pool represents administrative salaries for Department M. Both the ABC and TDABC models require all resource pools to establish links to cost objects through activities at one of the four-levels (facility, product, batch and unit). Under ABC classification, administration is a facility-level activity in Department M. In contrast, the RCA model allows for the direct allocation of resource costs from a resource pool to a cost object without identifying an activity between the two. As such, management can eliminate unnecessary facility-level activities in the costing model. Under the new RCA-based costing model, the fixed labour cost ($30,000) is allocated to the three product lines directly. Consequently, the administrative activity is removed from the model.

The variable component of the labour resource pool is allocated to assembly and quality control activities on the basis of unit cost of the resource ($9 per hour) and levels of resource consumptions (number of hours) in the two activities. Accordingly $63,540 is allocated to assembly activity and $1,386 is allocated to quality control activity.

Allocations of machinery cost and indirect material cost are done in a way similar to the one under the ABC-based costing model. The machinery resource pool consists of both fixed and variable components. However, costs of both components are allocated to the same activity, assembly. As such, the fixed machinery cost ($102,000) merely constitutes the minimum amount of machinery cost allocated to assembly activity. Its existence does not change the way that machinery cost is allocated to product lines.

The outcomes of the RCA cost allocation process are presented in Tables 17-19. Similar to the ABC-based costing model, resource costs are allocated to product lines under a two-stage process. In the first stage, all resource costs except for the fixed labour cost are allocated to assembly and quality control activities. Fixed labour cost and activity costs are then allocated to the three product lines

Table 17: Allocation of Resource Costs to Activities – RCA-Based Costing Model

Resource Pool	Assembly	Quality Control
Labour	$63,540.00	$1,386.00
Machinery	$162,350.00	
Indirect Materials	$7,000.00	$496.00
Total	$232,890.00	$1,882.00

Table 18: Allocation of Fixed Labour Cost and Activity Costs to Product Lines – RCA-Based Costing Model

Activity	Cost per Activity Driver	Standard	Deluxe	Premium
Fixed Labour	N/A	$10,000.00	$10,000.00	$10,000.00
Assembly	$32.99	$130,629.52	$72,571.95	$29,688.53
Quality Control	$12.22	$1,075.43	$1,222.08	$733.25
Total		$141,704.95	$83,794.03	$40,421.78

Table 19: Summary of Resource Costs Allocation – RCA-Based Costing Model

Resource Pool	Committed Cost	Allocated Cost	Cost of Idle Resource
Labour	$100,000.00	$94,926.00	$5,074.00
Machinery	$170,000.00	$162,350.00	$7,650.00
Indirect Materials	$7,500.00	$7,496.00	$4.00

with the same activity drivers under the ABC-based costing model. As shown in Table 19, idle resources are identified in all three resource pools. However, costs of idle resources are significantly different under the TDABC-based costing model and the RCA-based costing model. The difference is caused by the way that the consumption of resources are recognised under the two models. In the TDABC-based costing model, the consumption of resources are solely driven by time spent on operating activities. In contrast, the consumption of resources under the RCA-based costing model is driven by multiple drivers. When the resources employed in operations are heterogeneous, as in the case of Department M, the RCA-based costing model can provide a better picture of the cost of idle resources.

Conclusion

The TDABC and RCA models represent two different philosophies on the development of cost management systems. The TDABC model is specifically designed to simplify implementation and maintenance of cost management systems through usages of single measure of resources capacity and quantity-based resource-activity cost drivers in the model. Service organisations with large proportions of human and IT resources and standardised operating activities are likely to benefit most from the model as time is an appropriate common measure of resources for this type of organisations. In contrast, the RCA model attempts to capture complexities of contemporary manufacturing activities by recognising complex inter-relationships between resource pools and cost objects and relies on integration with ERP system to manage complexities of the model. It is more suitable to manufacturing organisations that employ multiple heterogeneous resources in their operations.

Despite the different philosophies underpinning the two models, the development of the TDABC and RCA models are strongly influenced by the ABC model. It is not surprising that some similarities do exist between the two models. However, the key difference is the recognition of idle resources; which is a common feature of the TDABC and RCA models, and which plays a key role in the two models. Recognition of idle resources in the two models simplifies the development and maintenance of the cost management system, and enables cost management systems that adopted the two models to provide more relevant and reliable cost information for decision making.

References

Anderson, S.W., (2007), "Managing Costs and Cost Structure throughout the Value Chain: Research on Strategic Cost Management", In Chapman, C. S., Hopwood, A.G., and Shield, M.D., *Handbook of Management Accounting Research,* 2, Elsevier, Oxford, pp. 481-506.

Baird, K. M., Harrison, G. L., and Reeve, R. C., (2004), "Adoption of Activity Management Practices: A Note on the Extent of Adoption and the Influence of Organizational and Cultural Factors", *Management Accounting Research*, 15(4), pp. 393-399.

Baetge, J., Berndt, H., Bruns, H., von Colbe, W., Coenenberg, A., Korst, H., Lederle, H., Metze, A., Ordelheide, D., Pfingsten, H., Reinhard, H., Schnicke, C., Schwitters, J., Seeberg, T., Siepe, G., Urban, P., Weber, H., Weisműller, A., and v. Wysocki, K., (1995), "Working Group on External Financial Reporting of the Schmalenbach-Gesellschaft-Deutsche Gesellschaft fűr Betriebswirtschaft", *Accounting Horizons*, 9(3), pp. 92-99.

Barrett, R., (2005), "Time-Driven Costing: The Bottom Line on the New ABC", *Business Performance Management*, March, pp. 35-39.

Benjamin, L. and Simon, T., (2003), "A Planning and Control Model Based on RCA

Principles", *Cost Management*, 17(4), pp. 20-27.

Buchheit, S., (2003), "Reporting the Cost of Capacity", *Accounting, Organizations and Society*, 28(6), 549-565.

Buchheit, S., (2004), "Fixed Cost Magnitude, Fixed Cost Reporting Format, and Competitive Pricing Decisions: Some Experimental Evidence", *Contemporary Accounting Research*, 21(1), 1-24.

Byrne, S., Stower, E., and Torry, P., (2009), "Is ABC Adoption a Success in Australia?", *Journal of Applied Management Accounting Research*, 7(1), pp. 37-52.

Chenhall, R. and Langfield-Smith, K., (1998), "Adoption and Benefits of Management Accounting Practices: An Australian Study", *Management Accounting Research*, 9(1), pp. 1-19.

Clinton, B. D. and Keys, D. E., (2002), "Resource Consumption Accounting: The Next Generation of Cost Management Systems", *Focus Magazine*, 5, Retrieved August 19, 2009. http://www.focusmag.com/back_issues/issue_05/pages/rca.htm

Clinton, B. D. and Webber, S. A., (2004), "RCA at Clopay", *Strategic Finance*, 84(4), pp.20-26.

Cohen, S., Venieris, G., and Kaimenaki, E., (2005), "ABC: Adopters, Supporters, Deniers and Unawares", *Managerial Auditing Journal*, 20(9), pp. 981-1000.

Cooper, R., (1987), "Does Your Company Need a New Cost System?", *Journal of Cost Management*, 1(1), pp. 45-49.

Cooper, R. and Kaplan, R. S., (1988) "Measure Costs Right: Make the Right Decisions", *Harvard Business Review*, 66(9), pp. 96-103.

Cotton, W., Jackson, S., and Brown, R., (2003), "Note on a New Zealand Replication of the Innes et al. UK Activity-Based Costing Survey", *Management Accounting Research*, 14(1), pp. 67-72.

Drury, C., (1990) "Product Costing in the 1990s", *Accountancy*, May 1990, pp. 123-126.

Friedl, G., Kűpper, H., and Pedell, B., (2005), "Relevance Added: Combining ABC with German Cost Accounting", *Strategic Finance*, 86(12), pp. 56-61.

Gosselin, M., (1997), "The Effect of Strategy and Organizational Structure on the Adoption and Implementation of Activity-Based Costing", *Accounting, Organizations and Society*, 22(2), pp. 105-122.

Horngren, C. T., (2004), "Management Accounting: Some Comments", *Journal of Management Accounting Research*, 16, pp. 207-211.

Innes, J., Mitchel, F., and Sinclair, D., (2000), "Activity-Based Costing in the U.K.'s Largest Companies: A Comparison of 1994 and 1999 Survey Results", *Management Accounting Research*, 11(3), pp. 349-362.

Kaplan, R. S. and Anderson, S. R., (2004), "Time-Driven Activity-Based Costing", *Harvard Business Review*, 82(11), pp. 131-138.

Kaplan, R. S. and Anderson, S. R., (2007), "The Innovation of Time-Driven Activity-Based Costing", *Cost Management*, 21(2), pp. 5-15.

Kaplan, R. S. and Atkinson, A. A., (1998), *Advanced Management Accounting*, 3rd edition, Prentice Hall, Upper Saddle River.

Keys, D. E. and van der Merwe, A., (2001), "The Case for RCA: Excess and Idle Capacity", *Journal of Cost Management*, 15(4), pp. 21-32.

Kiani, R. and Sangeladji, M., (2003), "An Empirical Study about the Use of the ABC/ABM Models by Some of the Fortune 500 Largest Industrial Corporations in the USA", *Journal of American Academy of Business,* Cambridge, 3(1-2), pp. 174-182.

Krumwiede, K. and Suessmair, A., (2007), "Getting Down to Specifics on RCA", *Strategic Finance*, 88(12), pp. 50-55.

McNair, C. J., (2007), "Beyond the Boundaries: Future Trends in Cost Management", *Cost Management*, 21(1), pp. 10-21.

Pernot, E., Roodhooft, F., and van den Abbeele, A., (2007), "Time-Driven Activity-Based Costing for Inter-library Services: A Case study in a University", *Journal of Academic Librarianship*, 33(5), pp. 551-560.

Schildbach, T., (1997), "Cost Accounting in Germany", *Management Accounting Research*, 8(3), pp. 261-276.

Sharman, P. A., (2003), "The Case for Management Accounting", *Strategic Finance*, 85(4), pp. 43-47.

Sprinkle, G. B., (2003), "Perspectives on Experimental Research in Managerial Accounting", *Accounting, Organizations and Society*, 28(2-3), 287-318.

van der Merwe, A. and Keys, D. E., (2001), "The Case for RCA: Decision Support in an Advanced Cost Management System", *Journal of Cost Management*, 15(6), pp. 23-32.

van der Merwe, A. and Keys, D. E., (2002), "The Case for Resource Consumption Accounting", *Strategic Finance*, 84(10), pp. 1-6.

Webber, S. and Clinton, B. D., (2004), "Resource Consumption Accounting Applied: The Clopay Case", *Management Accounting Quarterly*, 6(1), pp. 1-14.

Weber, J. and Weibenberger, B. E., (1997), "Relative Einzelkosten- und Deckungsbeitragsrechnung: A Critical Evaluation of Riebel's Approach", *Management Accounting Research*, 8(3), pp. 277-298.