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Managing ICT Costs in E-Commerce Organizations with The Time-Driven Activity-Based Costing Model: A Note

Michael S. C. Tse
School of Accounting, Economics and Finance, Deakin University, Australia

ABSTRACT

As online business activities continue to grow, it is important for organizations to understand the implications of being an e-commerce organization and the appropriateness of applying existing business techniques to e-commerce organizations. This paper examines issues in managing information and communication technologies (ICT) costs in e-commerce organizations and the potentials of the Time-Driven Activity-Based Costing (TDABC) model as a solution to these issues. The reliance on ICT in value creation, the unique natures of ICT costs and the need to maintain updated costing models present new challenges to e-commerce organizations in management of ICT costs. The TDABC model, as a variant of the Activity-Based Costing (ABC) model, inherits the strengths of activity-based paradigm and has unique features that can provide additional benefits to e-commerce organizations.

Keywords: Activity-Based Costing; E-Commerce; ICT Cost Management; Time-Driven Activity-Based Costing

INTRODUCTION

E-Commerce is well and alive at the dawn of the twenty-first century. Proliferation of commercial web sites, combined with increasing acceptance of the Internet as transaction platform, propel the continuing growth of online business activities (Hong, Thong and Tam 2004; Park, Lee and Han 2007). In U.S., online retail sales demonstrate a stable growth in the 2000s. The value of online retail sales reached U.S. $69.2 billion in the fourth quarter of 2013 and accounted for 6% of the total retail sales in U.S. (U.S. Census Bureau 2013).

The growth of online business activities heightened the need to understand how organizations operate differently in the Internet-based business environment (Bremser and Chung 2005). When e-commerce first entered corporate agendas in the late 1990s, many people believed e-commerce would bring revolutionary changes to business environment and completely redefine the ways how businesses operate (Tapscott 2001). Nonetheless, people changed their views on impacts of e-commerce to business organizations after the burst of dot-com bubble. While the Internet was still regarded as a major force that changed the business environment, the impacts of e-commerce on business operations were considered to be evolutionary rather than revolutionary (Porter 2001).

As discussed in Spicer (1992), innovations in business practices can result in significant changes to ways that organizations function. Undoubtedly, e-commerce was one of the most important innovations in business practices in recent decades. Being an e-commerce organization does not necessarily require the abandonment of existing business practices (DeLone and McLean 2004). Nonetheless, management should reconsider the suitability of existing business techniques applied in different functional areas of their organizations in light of the change. As e-commerce organizations have different operating needs, a business technique that is suitable to traditional organizations may not be appropriate for e-commerce organizations.

This paper examines issues in managing information and communication technologies (ICT) costs at e-commerce organizations and the potentials of the Time-Driven Activity-Based Costing (TDABC) model as a solution to these issues. The TDABC model, as a variant of the Activity-Based Costing (ABC) model, represents an advance in the evolution of costing models. By examining the potentials of the TDABC model in managing ICT costs in e-commerce organizations, this paper seeks to advance understandings of issues faced by organizations in managing costs that are critical to their successes and the value of the TDABC model in organizations that fit well with the underlying assumptions of the model.

The remainder of this paper is organized as follows. The second section discusses the definition of e-commerce organizations and issues in managing ICT cost in e-commerce organizations. The third section briefly explains the concept of the TDABC model and discusses how issues identified in the second section can be addressed by adopting the TDABC model. A conclusion is then drawn in the fourth section.

ISSUES IN MANAGING ICT COSTS IN E-COMMERCE ORGANIZATIONS

A clear view on what constitutes e-commerce is important for any constructive discussion on e-commerce issues. Despite the widespread use of the term “e-commerce” since late 1990s,
confusions persist over the use of the term. Incompatible and competing definitions of the term are adopted by different parties and there is no consensus on the scope of the term (Mitchell 2001; Tse 2005; Tse and Gong 2008). In this paper, Tse (2005) definition of e-commerce is adopted. Tse (2005) and Tse and Gong (2008) argue that e-commerce is a type of organization rather a type of operating activity. What distinguishes an e-commerce organization from other organizations is the way that ICT are used in creation of value for its customers. Accordingly, e-commerce is defined as “organization with a value proposition that relies on joint applications of computing and telecommunication technologies” (Tse 2005).

Tse (2005) definition provides a useful ground for discussion on e-commerce issues as it focuses on how ICT is used in value creation. As the use of the Internet becomes commonplace in most countries, the mere fact of using ICT and the Internet in operations no longer distinguishes an organization from the others. However, as discussed in Ratnatunga, Vaz and Ramirez (2001) and Tse and Gong (2008), ICT can be applied in different manners. Organizations can distinguish themselves by the ways they integrate ICT into their business models (Tse and Gong 2012). Differentiating organizations which uses of ICT are integral to their business propositions (e-commerce organizations) from the ones that ICT is simply employed as one of the business tools enable researchers to look into unique issues that are associated with uses of ICT in creation of core business values.

The reliance on ICT to create core values increases the importance of ICT cost management in e-commerce organizations. As ICT is a critical component of their business models, e-commerce organizations often need substantial amounts of ICT resources to support their operations. As such, costs of ICT resources can have major financial implications on e-commerce organizations.

Organizational requirements of ICT resources are jointly determined by the length of time when ICT services (e.g. Internet connection) are available and levels of ICT services available (e.g. Internet connection bandwidth). Customers of e-commerce organizations, especially those of Business-to-Consumer (B2C) e-commerce organizations, generally expect around-the-clock availability of the organizations’ front-ends at the Internet. Consequently, all ICT services that support e-commerce organizations’ front-ends must be available at all times irrespective of the levels of operating activities. Actual usages of ICT services by the users may influence organizations’ decisions on levels of ICT service available but their direct impacts on organizational ICT resource requirements are minimal.

To ensure effective management of ICT costs, e-commerce organizations need to update their costing models when there are changes in their operating activities. ICT is a core component of any e-commerce organization’s operations. As such, the fit between ICT services and operating activities has significant impacts on the success of e-commerce organizations. As e-commerce organizations need to revise their operations from time to time to maintain their competitive advantages, changes in ICT services are likely to be more frequent in e-commerce organizations. Very often changes in operating activities are minor and are related to extensions or modifications of organizations’ existing operations. For example, Google has launched a specialized web search service for scholarly literature, Google Scholar (http://scholar.google.com) in 2004. The service is built upon Google’s existing web search service. As such, Google can use its existing ICT infrastructure to support the new service. The types of ICT services required to support the operations remain unchanged even though the levels of ICT services required may change. Changes in operating activities can also be a result of organizations’ moves to new areas of business. In 2005, Google has launched a web-based mapping service, Google Maps (http://maps.google.com). The service is a departure from the company’s traditional stronghold in web search service and brought the company to direct competition of traditional mapmakers like Ausway. To support the operations of Google Maps, new types of ICT services such as 3D image processing are required. Both types of operational changes can lead to changes in types and/or levels of ICT services required to support the new operations. Changes in organizations’ ICT services in turn require changes in costing models as resources consumption patterns for existing operating activities are likely to change and new activities may be added to costing models.

MANAGING ICT COSTS IN E-COMMERCE ORGANIZATIONS WITH TDABC MODEL

I Origin of the TDABC Model

The limitations of traditional volume-based costing models were well documented in the literature (Cooper 1987; Cooper and Kaplan 1988; Drury 1990). To address these limitations, the ABC model was developed in late 1980s. However, the ABC model failed to replace traditional volume-based costing models in most organizations’ cost management systems even though the theoretical superiority of the model was widely acknowledged by academics and practitioners (Drury 1990; Cohen, Venieris and Kaimenaki 2005; Tse and Gong 2009; Ratnatunga, Tse and Balachandran 2012). High level of time and resource requirements and difficulties in maintaining the currency of costing models drove organizations away from the model (Kaplan and Anderson 2004; Cohen et al. 2005; Pernot, Roodhoofd and van den Abbeele 2007).
As a response to implementation problems of the ABC model, Robert Kaplan proposed a variant of the ABC model, Time-Driven Activity-Based Costing (TDABC) model (Kaplan and Anderson 2004). TDABC model was designed to simplify implementation and maintenance of activity-based cost management systems through the removal of activity pools and the use of time-based resource-activity cost drivers (Tse and Gong 2009). Supporters of the TDABC model argued that the model was easier to implement and could potentially provide more accurate cost information (Barrett 2005; Everaert and Bruggeman 2007).

**Overview of The TDABC model**

As a variant of the ABC model, the TDABC model is grounded on the activity-based paradigm that underpins the ABC model. Allocation of costs to cost objects like products and customers is based on levels of activities consumed by each type of cost objects and drivers of activities can either be volume-driven or non-volume-driven. The key difference between the two models is the way that linkages of resource costs, activities and cost objects are established (Tse and Gong 2009).

Figure 1 presents a graphical representation of a typical ABC-based costing model. In the ABC model, all resource costs are allocated to cost objects. Activity pools are established as intermediates between resource costs and cost objects. Resource costs that are related to a particular activity are first allocated to relevant activity pool(s) before being allocated to cost objects. Direct link between resource costs and cost objects is not allowed in the model.

**Figure 1. A typical ABC-based costing model**

Accordingly, all resource costs must be allocated to activity pools in the ABC model. Theoretically speaking, allocation of resource costs to activity pools is based on a variety of activity drivers. In practice, however, management often allocates costs of resources based on estimated percentages of resources consumed by activities that are linked to a particular resource (Kaplan and Anderson 2004; Tse and Gong 2009).

As estimated percentages of resources consumption are based on existing activity pools, any change in an existing activity pool will result as changes in percentages of resources consumption for all resources that are linked to that activity pool. Similarly, any addition of new activity pool will require all resources that are linked to the new activity pool to change the percentages of resources allocated to other activities.

To ensure accuracy of cost information, regular updates of costing models are essential. Under the ABC model, updates of costing models are often complex and time-consuming. Difficulties in maintaining costing models is one of the major reasons that organizations abandon ABC-based cost management systems.

In contrast, resource costs and cost objects are directly linked with each other in the TDABC model. Figure 2 presents a graphical representation of a typical TDABC-based costing model. Resource costs are allocated to cost objects through a series of time-activity cost drivers (Barrett 2005; Tse and Gong 2009). Each time-activity cost driver represents the consumption of a particular resource to complete an activity. If an activity requires multiple resources to complete a particular activity, then multiple time-activity cost drivers will be established between the cost objects that consume the activity and resources consumed by the activity. All resources are linked to one or more cost objects through time-activity cost drivers. More than one time-activity cost drivers may exist between a resource and an output as a resource may be consumed by several different activities to
serve the same output.

**Figure 2. A typical TDABC-based costing model**

Time-activity cost driver consists of two components: cost per time unit of capacity and unit time of activities (Kaplan and Anderson 2004; Everaert and Bruggeman 2007). The former represents the cost of a resource for providing a particular level of service within a specified unit of time and the later represents the required unit of time to complete a particular activity.

To calculate the cost per time unit of capacity for a resource, the cost of the resource and the capacity of that resource must be determined at the first instance. In the TDABC model, capacity of a resource is expressed in the form of time units such as hours and minutes. There are four common measures of capacity, namely theoretical capacity, practical capacity, normal capacity and budgeted capacity (Brierley, Cowton and Drury 2006). Kaplan and Anderson (2004) suggest that practical capacity should be used in the TDABC model as its use allows management to provide allowances for breaks and downtime. Once the capacity of a resource is determined, the cost per time unit of capacity can be calculated by dividing the cost of the resource by the capacity of the resource.

Unit time of activities can be determined by two possible ways. First, management can use their own judgments to estimate the time required to complete the activities (Ratnatunga et al. 2012). Under this approach, time spent on each instance of an activity is assumed to be constant. Management uses their knowledge and experience to judge the time required to complete each activity. Employee surveys and historical organizational information are often used to assist them in forming the judgment.

Alternatively, unit time of activities can be determined by using time equations. The simplifying assumption of constant time consumption of all instances of an activity may not hold for some activities. If that is the case, then time equations can be used to capture complexities of the activity (Kaplan and Anderson 2004; Everaert and Bruggeman 2007; Gervais, Levant and Ducrocq 2010). A time equation can capture complexities of an activity by quantifying the impacts of factors that lead to variation of time spend on each instance of the activity. A typical time equation is expressed in the form of linear equation:

\[ Y = \alpha + \beta_1X_1 + \beta_2X_2 + \ldots + \beta_nX_n \]

In the above equation, \( Y \) donates the total time required to complete an instance of an activity and \( \alpha \) donates the minimum time needed to complete any instance of the activity. \( \beta_i \) represents a factor that complicates an instance of an activity and \( X_i \) represents the impact of that factor in term of time. An example of such factor is an organization’s previous relationship with a customer. If a customer is new to an organization, it will take longer time to process a transaction with the customer as additional time is required to receive and verify customer information.

By multiplying cost per time unit of capacity of a resource and unit time of a particular activity, a time-activity cost driver for the resource in performing that activity can be determined. Resource costs are then allocated to cost objects directly through the use of time-activity cost drivers. Unlike traditional volume-based costing models and the ABC model, not all resource costs are allocated to cost objects. When the total available time for a resource is different from the total time spend on all activities that consume the resource, the difference is recognized and reported to management (Tse and Gong 2009).

**The Case for Managing ICT Costs with TDABC model in E-Commerce Organizations**

Traditional volume-based costing models assume that all resources available to organizations are
consumed throughout the operating processes (Tse and Gong 2009). As such, all committed resource costs should be allocated to cost objects. As discussed in the second section, this assumption does not hold in e-commerce organizations. While levels of available ICT services in e-commerce organizations are influenced by anticipated demands of the services, actual levels of ICT services used by users bear no direct relationship with levels of available ICT services and amounts of committed ICT resources as long as ICT services are available at a particular time. As such, committed ICT resources may not be fully consumed from time to time. Cost management systems that allocate full costs of committed ICT resources to cost objects would generate cost information that is potentially misleading.

Another fundamental assumption of traditional volume-based costing models is the cause-and-effect relationship between costs of operations and volumes of organizational outputs (Langfield-Smith et al. 2006, p.349). Volumes of organizational outputs are assumed to be the primary driving force of costs of operations. This assumption may be true for traditional manufacturing organizations where direct production costs often dominate the cost structures. For e-commerce organizations, however, this assumption also doesn't hold. ICT costs and other indirect costs tend to dominate the cost structures of e-commerce organizations and the incidence of ICT costs has no direct relationship with volumes of organizational outputs.

Due to unique natures of ICT costs and their importance to e-commerce organizations, operations of e-commerce organizations do not match the underlying assumptions of traditional volume-based costing models. As such, traditional volume-based costing models are inappropriate for ICT cost management in e-commerce organizations. Gerlach et al. (2002) and Roztocki (2003; 2010) propose the use of the ABC model in ICT cost management as the ABC model is considered as a more sensible costing model for ICT cost management. However, limitations of the ABC model make widespread adoption of the model in organizations difficult (Kiani and Sangeladj 2003; Kaplan and Anderson 2004; Cohen et al. 2005; Tse and Gong 2009).

As a variant of the ABC model, the TDABC model inherits its theoretical strengths. Similar to the ABC model, allocation of resource costs in the TDABC model is based on levels of activities consumed by cost objects. The activity-based paradigm distinguishes volume-driven cost drivers (for unit level activities) and non-volume-driven cost drivers (for batch, product and facility level activities). Both ABC and TDABC models allow management to identify the natures of the cost drivers and apply non-volume-driven cost drivers when appropriate. The ability to apply non-volume-driven drivers in costing models is important for e-commerce organizations as drivers of ICT costs are often non-volume-driven.

Simplicity in updates of costing models is a major factor that gives the TDABC model an edge over the ABC model as the costing model of choice for e-commerce organizations. The TDABC model simplifies the development and maintenance of costing models through the removal of activity pools and the use of time as the sole activity driver. Under the ABC model, all activity pools and their links to organizational inputs and outputs must be reviewed whenever a change is made to the model (Tse and Gong 2009). Addition of one activity pool can potentially change the relationships between all existing activity pools and organizational inputs and outputs. Under the TDABC model, updating costing models are much simpler as there is no need to change activity pools when a costing model is updated. Changes in activities only require revisions of the unit time of activities. When a new activity is added to a costing model, the time-activities cost drivers for that activity can be determined by multiplying the costs per time unit of capacity of existing resources and the unit time of the new activity. The new time-activity cost drivers have no impact on other existing time-activity cost drivers and the only new information needed is the unit time of the new activity. A change in an existing activity can be made by modifying the unit time of that activity and the removal of an existing activity from the model can be done by simply discarding the time-activity cost drivers for that activity.

As time is the sole measure of resource capacity in the TDABC model, the appropriateness of using time as a measure of resource capacity has significant impact on the suitability of the model to e-commerce organizations. The use of time as the measure of resources capacity is based on the assumption that consumptions of resources have direct relationships with lengths of time that resources are supplied. The validity of this assumption varies with different types of resources. Generally speaking, consumption patterns of physical resources like raw materials tend to be volume-driven. Relationships between consumption of physical resources and lengths of time that physical resources are supplied are indirect ones. As such, implementation of the TDABC model in organizations that rely heavily on physical resources in their operations may neither be simple nor effective (Ratnatunga et. al. 2012). In comparison, consumptions of human and ICT resources are more likely to be time-driven. Compared with human resources, ICT resources are more suitable for using time as the measure of capacity as consumptions of ICT resources are time-driven and the incurrence of ICT costs at designated levels of capacity bears no relationship with volumes of outputs. Given the importance of ICT costs to e-commerce organizations and the suitability of ICT resources in using time as the sole measure of capacity, the TDABC model is a natural match to e-commerce
organizations.

Besides simplifying implementation and maintenance of activity-based cost management systems, the TDABC model also has its own unique strengths that make it a better costing model for managing ICT costs in e-commerce organizations.

The ability to use time equations in the TDABC model provides e-commerce organizations a mean to measure the costs of customized services. Advances in ICT enable e-commerce organizations to customize their services to different customer groups at low costs (Jelassi and Ender 2005, p.83). Most e-commerce organizations make use of the technologies and offer some forms of service customizations to their customers. Under traditional volume-based costing models and the ABC model, costs of all instances of an activity are assumed to be the same. Cost difference from different instances of the same activity due to customization of services cannot be recognized in costing models. In contrast, the TDABC model recognizes the possibility of consuming different amounts of resources in different instances of the same activity (Kaplan and Anderson 2004). Time equations can be established to calculate consumptions of resources in each instances of an activity. The use of time equations in the TDABC model enables management of e-commerce organizations to recognize differences in resource consumptions from performing standard and customized services and allocate resource costs to cost objects accordingly.

To meet customers’ expectations, most e-commerce organizations need to maintain around-the-clock availability of their Internet-based front-ends. Consequently, certain levels of Internet-related ICT services such as network connections and e-mail servers must be maintained at all times. As utilization rates of these ICT services vary over time, the existence of idle ICT resources is inevitable. Under traditional volume-based costing models and the ABC model, costs of idle ICT resources are allocated to cost objects as if they are parts of costs of consumed resources. Amounts of idle ICT resources and their impacts on operating expenses cannot be identified. The TDABC model rejects the assumption of full-utilization of available resources. Resource costs are allocated to cost objects only when consumptions of resources are identified and amounts of resource costs allocated to cost objects are based on lengths of time that resources are supplied. Unallocated resource costs are considered as costs of idle resources and are reported to management separately (Tse and Gong 2009; Kaplan and Porter 2011). Recognition of idle resources in the TDABC model enables management of e-commerce organizations to evaluate impacts of idle ICT resources on operations and take actions to optimize utilization rates of ICT services.

An analysis of the case presented in Roztocki (2003) provides evidence in support of the case for managing ICT costs with the TDABC model in e-commerce organizations. Roztocki (2003) presents a case study of SuperTools.com, an Internet-based Business-to-Customer (B2C) quality tools retailer. Similar to many Internet-based start-ups in the late 1990s, SuperTools.com has commenced its operations without a pre-exist customer base and relies on its website to showcase and sell the products. An ABC-based costing model is developed for SuperTools.com and eight categories of resource costs are identified (see Figure 3). Among the eight cost categories two of them (hardware maintenance and software maintenance) are related to ICT resources. In aggregate ICT costs account for more than 10% of the total organizational costs. The recognition of hardware maintenance and software maintenance costs as two separate cost categories and the aggregate weighting of the two categories of ICT resource costs demonstrate the importance of ICT costs to SuperTools.com.

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Cost</th>
<th>Percentage of total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selling and Administrative</td>
<td>$160,000.00</td>
<td>26.67%</td>
</tr>
<tr>
<td>Rent and Utilities</td>
<td>$75,000.00</td>
<td>12.50%</td>
</tr>
<tr>
<td>Sales and Marketing</td>
<td>$170,000.00</td>
<td>28.33%</td>
</tr>
<tr>
<td>Hardware Maintenance</td>
<td>$30,000.00</td>
<td>5.00%</td>
</tr>
<tr>
<td>Software Maintenance</td>
<td>$35,000.00</td>
<td>5.83%</td>
</tr>
<tr>
<td>Office Expenses</td>
<td>$45,000.00</td>
<td>7.50%</td>
</tr>
<tr>
<td>Product Shipment</td>
<td>$60,000.00</td>
<td>10.00%</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>$25,000.00</td>
<td>4.17%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$600,000.00</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

**Figure 3.** Categories of resource costs at SuperTools.com (source: Roztocki 2003)

Figure 4 presents the list of activities identified for the costing model of SuperTools.com. Four activities are related to delivery of products to customers (acquire goods, receive and handle goods, monitor quality, and prepare goods for shipment) while the other four are organizational level activities. Duration time appears to be an acceptable activity driver for all activities. As time can reasonably be used as the sole activity driver, adoption of the TDABC model is possible for SuperTools.com.
<table>
<thead>
<tr>
<th>Activity</th>
<th>Cost Allocated</th>
<th>Percentage of Allocated Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertise Products (Marketing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintain Web Pages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manage Customer Orders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manage Customer Inquiries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acquire Goods</td>
<td>$16,000.00</td>
<td>18.39%</td>
</tr>
<tr>
<td>Receive and Handle Goods</td>
<td>$7,500.00</td>
<td>8.62%</td>
</tr>
<tr>
<td>Monitor Quality</td>
<td>$24,000.00</td>
<td>27.59%</td>
</tr>
<tr>
<td>Prepare Goods for Shipment</td>
<td>$28,000.00</td>
<td>32.18%</td>
</tr>
<tr>
<td>Office Expenses</td>
<td>$9,000.00</td>
<td>10.34%</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>$2,500.00</td>
<td>2.88%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$87,000.00</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

**Figure 4.** List of activities of SuperTools.com (source: Roztocki 2003)  
For an organization that relies on its website to conduct business like SuperTools.com, maintaining a web page is a key operating activity. Figure 5 presents the list of resource costs allocated to the maintenance of a web page activity under the ABC-based costing model. Unsurprisingly, hardware maintenance and software maintenance costs are the two largest contributors to maintaining a web page activity costs. In aggregate, they account for more than 59% of the costs. The significance of ICT costs in the composition of web page activity costs at SuperTools.com provides evidence to the importance of ICT costs in supporting the operations of e-commerce organizations.

<table>
<thead>
<tr>
<th>Cost Category</th>
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</tr>
</thead>
<tbody>
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<td>Selling and Administrative</td>
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<td>18.39%</td>
</tr>
<tr>
<td>Rent and Utilities</td>
<td>$7,500.00</td>
<td>8.62%</td>
</tr>
<tr>
<td>Hardware Maintenance</td>
<td>$24,000.00</td>
<td>27.59%</td>
</tr>
<tr>
<td>Software Maintenance</td>
<td>$28,000.00</td>
<td>32.18%</td>
</tr>
<tr>
<td>Office Expenses</td>
<td>$9,000.00</td>
<td>10.34%</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>$2,500.00</td>
<td>2.88%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$87,000.00</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

**Figure 5.** List of resource costs allocated to the maintain web page activity

In summary, the case of SuperTools.com illustrates the importance of ICT costs to e-commerce organizations and the prospect of adopting the TDABC model to manage ICT costs. ICT costs are recognized as major resource costs in SuperTools.com and play a key role in supporting the organization’s operations. An examination of the activities performed in the organization suggests that time, the sole activity driver in the TDABC model, can be reasonably applied to all activities. As such, the adoption of TDABC model is not only feasible but also potentially beneficial to SuperTools.com.

**CONCLUSION**

Due to differences in ways that e-commerce organizations create value, management of e-commerce organizations need to reconsider the appropriateness of existing business techniques applied in different functional areas of their organizations. The reliance on ICT in value creation, the unique natures of ICT costs and the need to maintain updated costing models present new challenges to e-commerce organizations in management of ICT costs. However, traditional volume-based costing models that are adopted in most organizations are inadequate in dealing with these challenges.

The TDABC model inherits the strengths of activity-based paradigm and has unique features that are beneficial to e-commerce organizations. The model overcomes difficulties in implementation and maintenance of activity-based cost management systems through removal of activity pools and use of time-based resource-activity cost drivers in the model. The TDABC model also provides unique benefits to e-commerce organizations through recognizing complexities of operating activities and the existence of idle resources. Time equations can be used to capture complexities of activities and idle resources are identified and reported to management separately. Adoption of the TDABC model enables management of e-commerce organizations to implement and maintain effective activity-based cost management systems that generate more accurate and relevant ICT cost information.

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