

# Evaluating Investments For Services: A Value Chain Analysis Framework

Narczyz Roztocki, State University of New York at New Paltz, USA  
Heinz Roland Weistroffer, Virginia Commonwealth University, USA

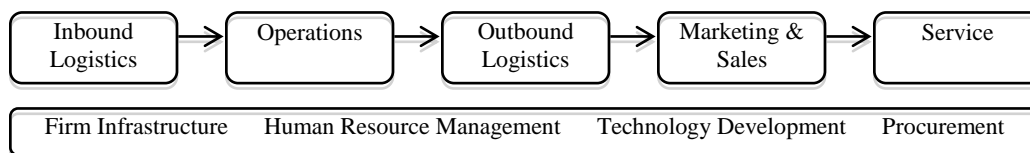
## ABSTRACT

*This paper presents a framework based on value chain analysis to evaluate investments for services. The rationale for this approach is that to properly evaluate the benefits of any services investments, the value and cost interactions resulting from different business processes or activities need to be considered. To achieve reliable cost estimations, the framework employs a costing system, which integrates activity-based costing with the economic value added performance measure. The proposed framework is illustrated using a hypothetical case of an information technology investment in a car repair shop.*

**Keywords:** Value chain analysis, activity based costing, economic value added, services investments

## INTRODUCTION

Services represent a substantial part of business output and investments to provide these services, such as Information Technology (IT) to facilitate the services, represent a substantial portion of corporate spending. Like with most investments, the objective of such investments for providing services is to create business value. But in order for any investment to have a positive impact on business value, additional revenues need to be created or overall costs need to be reduced. Thus, when evaluating investments for potential contributions to the improvement in business performance, the interactions of costs among the various business processes and activities need to be considered. The *value chain model* shown in Figure 1, which describes an organization as a group of activities (Porter and Millar 1985), appears to be well suited for this kind of cost analysis.



**Figure 1: Generic Value Chain**

The top part of the figure shows the primary value chain activities. Inbound logistics includes receiving and inventorying of materials, operations refers to the activities that transform the input materials into finished products, outbound logistics refers to getting the products to the customers or the retail outlets, marketing and sales refers to activities intended to persuade the customers to purchase the products, and service refers to after-sales activities, such as warranty repairs and customer support. Firm infrastructure, human resource management, technology development, and procurement include all the support activities required to facilitate the primary value chain activities. This generic value chain is typical for traditional manufacturing companies following a “push” approach, where goods are first produced and then sold.

For a services-oriented business, operations refer to the activities that create the services offered, and outbound logistics to the activities required to make the services available to the customers. For example, a car repair workshop is a primarily services oriented business. It requires inbound logistics for the spare parts and other supplies needed to make repairs and do maintenance. Moreover, moving cars to the repair shop, for example by

towing, may also represent inbound logistics. Repairs and maintenance represent the primary services of the business and are part of operations. Delivering the repaired car to the customer is part of outbound logistics. Sales and marketing here may precede the operations or even the inbound logistics, rather than following the outbound logistics. For example, in most car repair workshops, expensive and non-standard spare parts are ordered only after the customer approved the job. Thus, to a certain extent car repair workshops follow a “pull” approach, where spare parts are ordered “just-in-time” for a particular job, after the scope of the repair work has been determined by the customer order and perhaps an initial inspection. Furthermore, what is referred to as service in the generic value chain, here refers to after-repair customer support, such as handling complaints and carrying out rework. The support activities are basically the same for a service-oriented business as for a manufacturing business. A modified value chain model for service-oriented companies may thus be as shown in Figure 2.

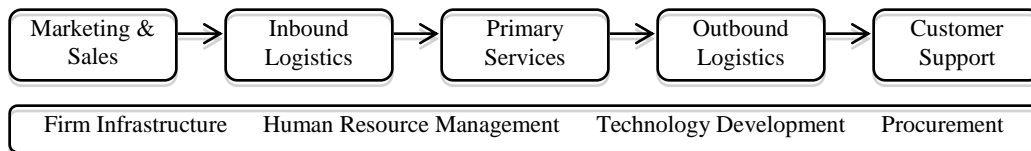


Figure 2: Service Value Chain

In business practice though, despite the fact that the general value chain model is one of the most widely accepted concepts, the value chain model is not commonly used for the purpose of evaluating investments to provide services. One reason for this may be that in many companies, the traditional cost accounting system employed makes a robust value chain analysis impracticable.

The traditional, volume-based, cost accounting systems are ineffective for value chain analysis because they are designed for accountants to keep accounting ledgers and not for managers to handle operating and capital costs (Hergert and Morris 1989; Ness and Cucuzza 1995). In traditional cost accounting, non direct costs are typically allocated proportionally on the basis of direct labor hours (Kaplan 1984). This simple and straightforward procedure was introduced many decades ago when the direct labor costs typically made up the greater part of total expenses (Kaplan 1988). In today’s knowledge based economy however, this unsophisticated cost allocation procedure not only produces distorted cost estimates, but also precludes the wide application of value chain analysis, as the latter requires reliable cost estimates for individual activities.

In order to effectively use value chain analysis for evaluating investments for services, reliable cost estimates for the different organizational activities are essential. The value chain analysis needs to be supported by a dependable cost management system, which simultaneously focuses on all three categories of costs: direct costs, operating costs (also called overhead), and capital costs (see Table 1).

Table 1: Examples for Cost Categories

Direct Costs	Operating Costs	Capital Costs
Direct Labor	Administrative Salaries	Interest Payments
Materials	Office Expenses	Dividends
Parts	Rent	
	Hardware and Software Maintenance	

In order to increase the efficiency of value chain analysis for managerial decision-making, several authors proposed the use of *activity-based costing (ABC)* for estimating the operating cost of activities (Dekker 2003; Shank and Govindarajan 1992), and some authors suggested using ABC specifically for evaluating IT investments (Peacock and Tanniru 2005; Roztocki and Weistroffer 2004; Roztocki and Weistroffer 2005).

ABC is a more sophisticated cost management system, designed more specifically to target operating costs. In contrast to the traditional allocation procedure, which uses a single cost driver (direct labor hours), ABC employs

multiple cost drivers by looking at a number of business processes or activities to trace operating costs. (See, for example, (Cooper 1988; Cooper 1989)).

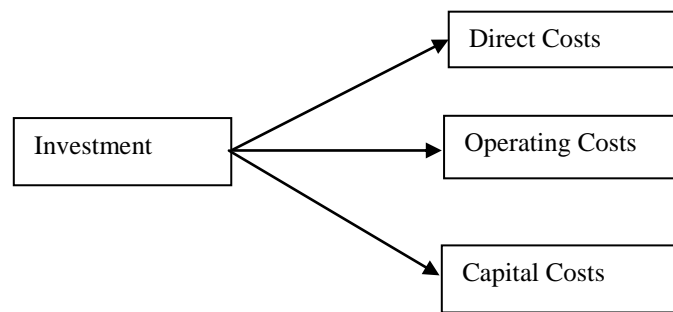
Although ABC leads to improvements over the traditional cost accounting method (Needy et al. 2003), capital costs, an important aspect in all types of investments, are not adequately gauged by this approach (Roztocki and Needy 1999). Therefore, in order to more reliably account for the capital costs, some authors have proposed to combine ABC with *EVA* (Cooper and Slagmulder 1999; Hubbell 1996a; Hubbell 1996b; Roztocki and Needy 1999). *EVA* (*economic value added*) is a financial value-based performance measure which purposely focuses on capital cost (Dodd and Chen 1996; Stewart 1991; Stewart 1994; Stewart 1995).

In the *integrated ABC-and-EVA* system (Roztocki 2003; Roztocki and Needy 1999), the ABC component is used to trace operating costs and the EVA component handles the capital costs. The framework for evaluating new investments for services presented in this paper uses the integrated ABC-and-EVA system as a basis for value chain analysis.

**PROPOSED FRAMEWORK**

The framework proposes a three-phase method for evaluating investments to improve existing services or to provide new services. In the first phase, the major activities of a company’s service value chain and the current costs of performing these activities are determined. In essence, this procedure follows the integrated ABC-and-EVA system, namely assigning expenses resulting from the consumption of resources to activities (Roztocki 2003; Roztocki and Needy 1999). A company already using the integrated ABC-and-EVA system will merely need to update the cost figures, while a company not currently using this system may require expending more effort.

In the second phase, the impact of the investment on the costs of each activity is assessed. Generally, the level of expenses and the effect of the new technology implementation need to be projected for future expectations. In many cases, new technology implementation will change the cost structure for activities. For example, a new information system may require less maintenance (which will reduce operating costs) but will require substantial capital spending (which will increase capital costs). Thus, the impact on each category of costs must also be taken into consideration (see Figure 3).



**Figure 3: Impact of the IT Investment on the Cost Structure**

Finally, in the third phase, the changes in the cost structure, including the projected new revenues and the additional costs of the investment, will be evaluated, weighted, and compared. Figure 4 gives an overview of the complete framework.

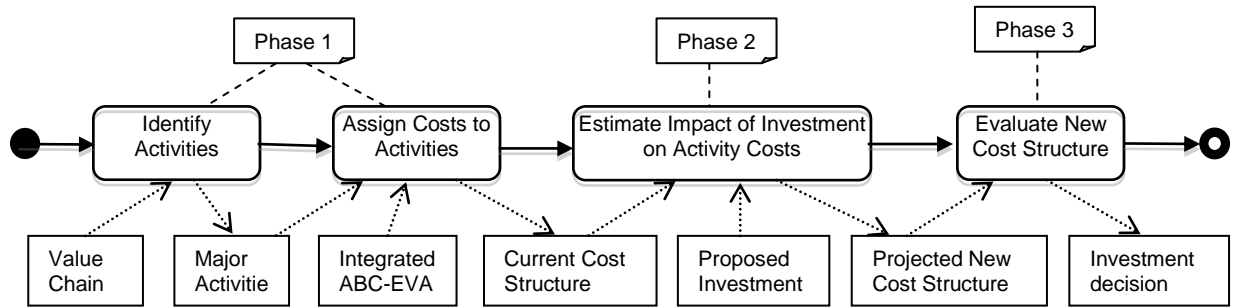


Figure 4: Overview of the Framework

A systematic approach to the evaluation of the projected new cost structure may be a comparison between all costs without the new investment and with the new investment (see Figure 5).

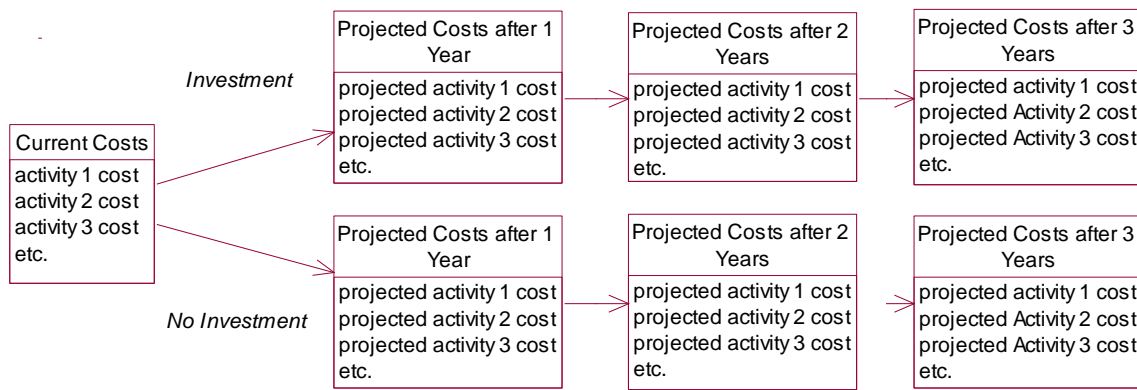


Figure 5: Projected Costs

Since frequently the objective of the investment is to spawn new business by providing additional services, the expected changes in revenues resulting from this must also be evaluated (see Figure 6). In some cases, passing up on a particular investment may result in a loss of existing customers and thus of revenues.

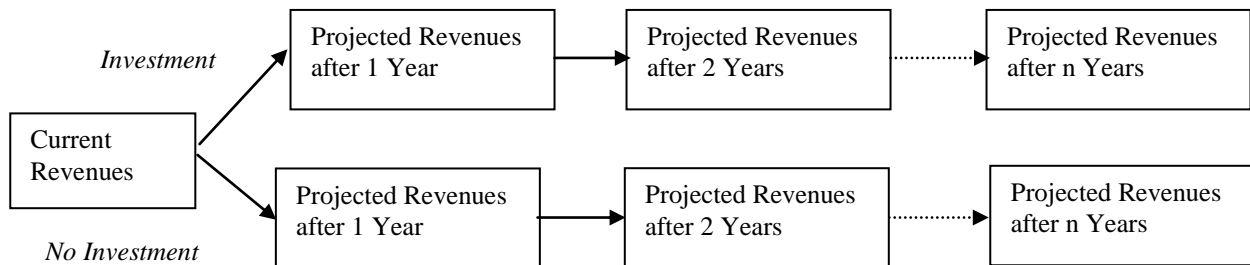
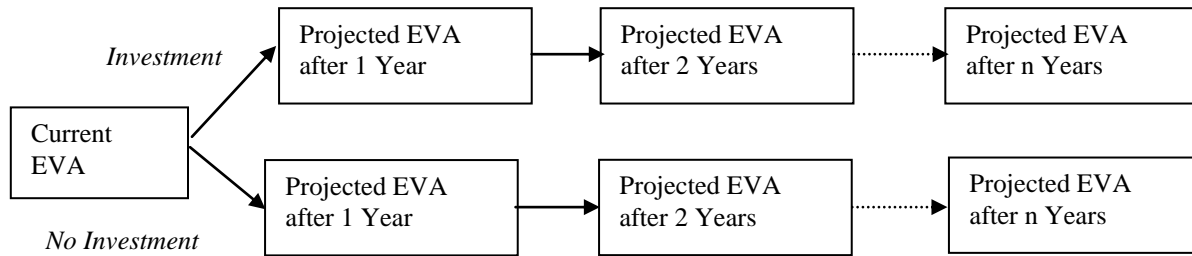


Figure 6: Projected Revenues

A final step in evaluating new investments for services using the proposed framework is to estimate the economic value added (see Figure 7).



**Figure 7: Projected EVA**

Simplified, EVA is calculated by subtracting direct, operating, and capital costs from the revenues. The procedure of evaluating new services investments by using the integrated ABC-and-EVA system is illustrated in the following section.

**NUMERICAL EXAMPLE**

In order to illustrate the use of our framework, let us consider the example of a large car repair company considering a major investment in a new information system. The main services offered by the company are periodical inspections as part of car maintenance and all types of repairs. There is relatively high fluctuation in volume and magnitude of repair jobs. Especially large, unexpected repair jobs may cause delays in other orders. The new system is expected to better track repair jobs, improve customer relations management, as well as provide more efficient ordering and inventory control to avoid repair delays due to shortage of parts.

In general, the process of evaluation begins with the identification of the major business activities in the company’s service value chain. A good starting point is a small number of generic activities (Porter and Millar 1985) which then can be adjusted and expanded to meet specific company needs. Special attention should be devoted to activities that are likely to be impacted by the proposed investment. In our illustrative example, as in many service companies, the value chain starts with creating demand for its services. This initial activity in the value chain includes advertising in local media and sending reminder notices to existing customers about scheduled inspections, often accompanied by coupons, to promote customer loyalty. The customer orders for routine inspections and repairs are mostly scheduled in advance by phone, but sometimes there are emergency walk-ins, or broken-down cars are picked up and towed. All incoming repair jobs undergo an initial check, and depending on the extent of the required repairs, the customer is provided with estimates on time and costs, and asked for authorization to proceed. Following customer authorization, any required parts not in inventory are ordered from a large dealer. After the repairs are performed, each car is inspected and delivered to the customer. Most cars are picked up from the shop by the customer, though sometimes a car is delivered to a customer’s home or place of work.

For sake of simplicity, in our illustration we show only eight primary activities and four support activities. In many real companies, depending on their size and business, the total number of activities may be expanded to several hundred. Table 2 depicts the activities in our illustration.

Table 2: Value Chain Activities

Activity Type	Activity
<b>Primary Activities</b>	Market Services
	Process Customer Repair Orders
	Receive Spare Parts
	Handle Inventory
	Perform Repairs
	Inspect and Test
<b>Support Activities</b>	Deliver to Customer
	General Business Management
	Manage Technology Resources
	Administer Financial Operations
	Manage Human Resources

Once the activities in the company's value chain are established, their total costs (direct, operating, and capital costs) are estimated by using the ABC-and-EVA system (see for example (Roztock and Needy 1999)). Table 3 summarizes direct, operating, and capital costs for various activities.

Table 3: Activity Costs

Activity	Direct Cost	Operating Cost	Capital Cost
Market Services	\$60,000.00	\$40,000.00	\$0.00
Process Customer Repair Orders	\$60,000.00	\$50,000.00	\$0.00
Receive Spare Parts	\$90,000.00	\$90,000.00	\$0.00
Handle Inventory	\$50,000.00	\$50,000.00	\$40,000.00
Perform Repairs	\$300,000.00	\$400,000.00	\$150,000.00
Inspect and Test	\$30,000.00	\$20,000.00	\$10,000.00
Deliver to Customer	\$30,000.00	\$40,000.00	\$10,000.00
General Business Management	\$50,000.00	\$60,000.00	\$10,000.00
Manage Technology Resources	\$80,000.00	\$80,000.00	\$70,000.00
Administer Financial Operations	\$20,000.00	\$30,000.00	\$10,000.00
Manage Human Resources	\$30,000.00	\$40,000.00	\$0.00
<b>Total</b>	<b>\$800,000.00</b>	<b>\$900,000.00</b>	<b>\$300,000.00</b>

Based on the estimated costs for various activities, the impact of the new investment on these activities and their costs are projected. In many cases, the investment will dramatically change the cost structure of particular activities. As a consequence of reducing direct labor content, many automate technology investments will experience a substantial reduction in the direct costs, but an increase in the capital costs. Some operating costs are likely to be reduced, but new, additional operating costs may also occur, due to new overheads. This possible increase in overhead costs could result from additional system requirements, while the investments themselves will create a need for additional capital and therefore increase the capital costs.

Regarding the primary activities, the investment in our example is expected to reduce the direct and operating costs of *process customer repair orders*, *receive spare parts*, and *handle inventory*. At the same time, the investment will result in additional capital costs for most activities. These new incurring capital costs will be partially offset in the activity *handle inventory*, because the new system is expected to improve demand prediction and allow lowering the inventory levels.

The new investment is expected, however, to increase all costs of the supporting activity *manage technology resources*. The direct costs are expected to increase because of the new software and hardware maintenance agreements, while the operating and capital costs will increase due to the expected equipment

depreciation and other capital related expenses. Table 4 summarizes projected direct, operating, and capital costs for various activities if the investment is accomplished.

**Table 4: Expected Activity Costs after IT Investment**

Activity	Direct Cost	Operating Cost	Capital Cost
Market Services	\$60,000.00	\$40,000.00	\$0.00
<b>Process Customer Repair Orders</b>	<b>\$20,000.00</b>	<b>\$30,000.00</b>	<b>\$10,000.00</b>
<b>Receive Spare Parts</b>	<b>\$60,000.00</b>	<b>\$80,000.00</b>	<b>\$10,000.00</b>
<b>Handle Inventory</b>	<b>\$10,000.00</b>	<b>\$30,000.00</b>	<b>\$30,000.00</b>
Perform Repairs	\$300,000.00	\$400,000.00	\$150,000.00
Inspect and Test	\$30,000.00	\$20,000.00	\$10,000.00
Deliver to Customer	\$30,000.00	\$40,000.00	\$10,000.00
General Business Management	\$50,000.00	\$60,000.00	\$10,000.00
<b>Manage Technology Resources</b>	<b>\$90,000.00</b>	<b>\$100,000.00</b>	<b>\$110,000.00</b>
Administer Financial Operations	\$20,000.00	\$30,000.00	\$10,000.00
Manage Human Resources	\$30,000.00	\$40,000.00	\$0.00
<b>Total</b>	<b>\$700,000.00</b>	<b>\$870,000.00</b>	<b>\$350,000.00</b>

Next, the changes in the cost structure are evaluated. These changes in costs are indicated in bold in Table 4, and shown explicitly in Table 5.

**Table 5: Expected Changes in Cost Structure after IT Investment**

Activity	Direct Cost	Operating Cost	Capital Cost
Market Services	\$0.00	\$0.00	\$0.00
Process Customer Repair Orders	<b>-\$40,000.00</b>	<b>-\$20,000.00</b>	<b>+\$10,000.00</b>
Receive Spare Parts	<b>-\$30,000.00</b>	<b>-\$10,000.00</b>	<b>+\$10,000.00</b>
Handle Inventory	<b>-\$40,000.00</b>	<b>-\$20,000.00</b>	<b>-\$10,000.00</b>
Perform Repairs	\$0.00	\$0.00	\$0.00
Inspect and Test	\$0.00	\$0.00	\$0.00
Deliver to Customer	\$0.00	\$0.00	\$0.00
General Business Management	\$0.00	\$0.00	\$0.00
Manage Technology Resources	<b>+\$10,000.00</b>	<b>+\$20,000.00</b>	<b>+\$40,000.00</b>
Administer Financial Operations	\$0.00	\$0.00	\$0.00
Manage Human Resources	\$0.00	\$0.00	\$0.00
<b>Total</b>	<b>-\$100,000.00</b>	<b>-\$30,000.00</b>	<b>+\$50,000.00</b>

After the changes in the cost structure are evaluated, the projected changes in revenues are estimated as depicted in Table 6. The new technology will allow faster turnover of repair jobs, due do fewer delays caused by lack of spare parts, and thus allows the business to better retain existing customers and perhaps take on new customers. In addition, marketing may be improved by, for example, sending customized reminder notifications to existing customers by factoring in driving habits gleaned from past records. Furthermore, new customers can be reached by more targeted marketing, to take advantage of the increased capacity for repair jobs. Overall, the new system is expected to have a positive impact on revenues as depicted in Table 6.

Table 6: Expected Changes in Revenues

	No IT Investment	IT Investment
Revenues	2,200,000.00	2,270,000.00

After changes in cost structures and revenues are estimated, the projected Economic Value Added can be calculated as shown in Table 7. In this context, EBIT is defined as Earnings before Interest and Tax.

Table 7: Expected Changes in Economic Value Added

	No IT Investment	IT Investment
Revenues	2,200,000.00	2,270,000.00
Direct Cost	-800,000.00	-700,000.00
Operating Cost	-900,000.00	-870,000.00
EBIT	500,000.00	700,000.00
Tax (35%)	-175,000.00	-245,000.00
Capital Cost	-300,000.00	-350,000.00
<b>Economic Value Added</b>	<b>25,000.00</b>	<b>105,000.00</b>

The analysis is then performed for a number of years during which the proposed investment is expected to continue to have an impact on the firm’s costs and revenues, and thus EVA. Figure 8 summarizes the projected EVA over the period of 3 years.

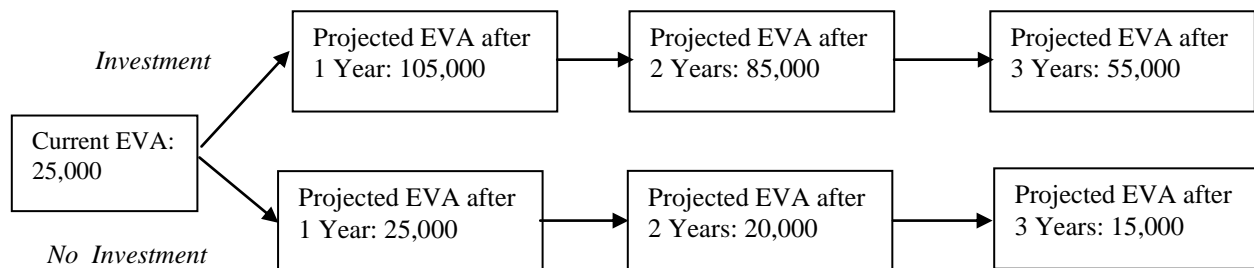


Figure 8: Projected EVA for Numerical Example

Based on the information derived from the analysis, the company’s decision makers can now determine if the investment appears to be cost effective and whether or not they should pursue it. In our illustration, the investment is expected to result in the increase of the economic value added and therefore seems justifiable.

It is conceivable that in some cases, knowing that the particular investment is not currently cost effective, the managers may postpone their decision until the current costs of activities increase to a certain level and/or the cost for hardware and software decreases, making this investment more attractive.

**CONCLUSIONS**

This paper proposes a framework to deal with the complex issue of reliably evaluating investments for providing services. A major contribution of this paper lies in the integration of the value chain model for services with the integrated ABC-and-EVA costing system and its application to evaluating investments.

The numerical example demonstrates the applicability of the framework using a fictional company. Future research to validate the framework requires field studies involving real service- oriented organizations.

**AUTHOR INFORMATION**

**Narczyz Roztocki** is an Associate Professor of Management Information Systems at the State University of New York at New Paltz. His research interests include IS/IT investment evaluation, IS/IT productivity, IS/IT investments in emerging economies, technology project management, and e-commerce. He has published in numerous journals and conferences including: the Electronic Journal of Information Systems in Developing Countries, Electronic Journal of Information Systems Evaluation, International Journal of Service Technology and Management, Journal of Global Information Technology Management, Journal of Information Science & Technology, and proceedings of the AMCIS, DSI, ECIS, ECITE and HICSS.

**Heinz Roland Weistroffer** is an Associate Professor of Information Systems in the School of Business at Virginia Commonwealth University in Richmond. His research interests include economics of information technology, computer assisted decision support, security models, and systems development. He has published in IEEE Transactions on Software Engineering, the Journal of Multi-Criteria Decision Analysis, Annals of Operations Research, Socio-Economic Planning Sciences, Computational and Mathematical Organization Theory, Journal of Information Systems Security, Journal of Computer Information Systems, and Information Technology for Development, among many other journals, as well as in numerous conference proceedings such as AMCIS, HICSS, ECIS, ECITE, and DSI.

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**NOTES**