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APPLICABILITY OF ACTIVITY BASED COSTING IN NEW PRODUCT DEVELOPMENT PROCESSES

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Abstract:
The purpose of the article is to emphasis that activity based costing is a proper tool for engineers to enhance their decision-making process while developing new product. The theoretical analysis shows that variety of factors shall be encompassed into new product decision-making process and therefore engineers and management should pay great attention to proper cost allocation. The paper suggests the usage of Activity Based Costing methodology for new product development decision-making process. Author states that application ABC in the process of rational decision-making referring to new product development enables managers and engineers to prioritize possible solutions, and reallocate resources used in production process in order to meet wider organizational goals. It would also contribute in cooperation of managers and engineers for the sake of organizational goal.

Key words: *management accounting, activity based costing, new product development, production engineering*

INTRODUCTION

Market volatility and rapid technological changes resulting in changing business environment forces nowadays companies to continuously look for new product or to innovate existing product. Binging a new product to the market or development of existing product requires not only good understanding of customers' needs, but firstly depend upon thorough analysis of technological, financial and time variables. Based on the above, companies develop continuous innovation processes to overcome many uncertainties and challenges. New product development process consists of series of activities employed. Some stagers rely upon cooperation with financial departments. The cooperation involves direct, indirect costs analysis, pricing settlements, the impact of new product on the entire assortment of products, forecast of revenue and profit. Costing system originally established to fight shortages of traditional cost systems might be of great use in that case. The Activity Based Costing (ABC), developed by Robin Cooper and Robert Caplan, in the eighties of XX century, is a methodology that has developed to cost management system focusing on decision-making regarding the optimal product assortment, competitive strategies. Its main idea of the ABC system is to allocate indirect (overhead) costs directly to the product, services or customers based on the activities undertaken in order to manufacture product, render service or sell a product to a specific customer. Hence, the system assigns cost to activities based on their use of resources, and assigns cost to objects (product, service, customer) based on their use of activities. Properly introduced system ensures very precise tracking of costs in purchase, manufacturing, and selling processes within the organization. Hence, it can of a great use for engineers to make rational decisions regarding new product development.

THE ROLE OF MANAGEMENT ACCOUNTING IN NEW PRODUCT DEVELOPMENT PROCESS

The new product development is a process of translating an idea into a tangible (intangible) asset representing a finished product (service). Prior to implementing any new product, company's management (including engineers and accountants) wants to understand the costs of development and the expected returns. Introducing a new product (or service, process) includes not only direct costs changes, but it also encompasses expenses of contract negotiations, compliance reviews or testing. Moreover, the process of developing new product includes a quest to offer product at the lowest cost and to eliminate non-value added expenses. It should be achieved together with optimization of processes and with effective and rational use of scare economic resources being under control of a company. In order to achieve goals settled for a new product development process, company's management needs tools to investigate relations between crucial product characteristics or between product functionality, quality strategy and costs of manufacturing and selling a product.

Previous research has shown that although there is no optimal strategy for new product development process, accounting information intelligible influences the procedure [6]. Accounting information interacts with other types of accounts, especially uncertainty and different types of company's strategy. Other studies concentrated on management control systems' design in new product development [3, 4] or on the need for control practices together with planning focused on meeting the expectations placed by certain external parties [5]. Abernethy and Brownell [1] examined the role of accounting and non-accounting controls in a research and development setting giving priority to behavior and forms of control in uncertain business envi-

ronment. Summarizing, recent theoretical and empirical work indicates that management accounting, especially in the area of control systems, are important element in enhancing the process of new product development.

Management accounting is a process of providing financial and non-financial information for managers. Managers need information to make decisions regarding manufacturing and organizational planning, i.e. formation of products' assortment, determination of maximum cost per production unit, required production output in order to cover fixed costs, expenses within organizational units etc. Management accounting usually is a subsystem of accounting information system in the company, but it also uses its own methods and concepts as it focuses not only on present resources and financial results of past events. Moreover, it focuses on customers' requirements, organizational changes as well as operational management including management of production processes, diversification of products, capital investment policy or strategic management.

The latest information technologies enabled management accountant to remain closely with the changes in the company business environment and to play a constructive role in the changes of the organization. It is involved in the process of manufacturing management, materials management, and production planning as well as production control that are all part of production engineering.

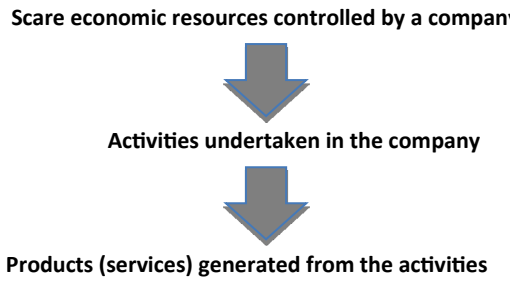
THE ORIGIN AND ASSUMPTIONS OF ACTIVITY BASED COSTING

The last decades of XX century are characterized by a large development of new technologies, as well as automation and computation of production processes. At the same time quality and diversity of product have gained more attention of engineers as production process began more customer and market-oriented. These characteristics have considerable influenced the structure of costs incurred by production companies. In response to the changes, at the end of the eighties of XX century, two American accounting scientists introduced the concept of Activity Based Concept (ABC). It is a method by which accounting managers attempt to identify the discrete costs associated with a product, service or a process [7]. As assigning costs to products is based on the resources they consume, the ABC is an alternative to traditional accounting in which indirect costs are most often allocated in proportion to an activity's direct costs or in proportion to the volume of output [8]. Traditional approach is not satisfactory because it is possible that two different product exist that consume the same amount of direct costs while uneven amount of indirect costs al cost allocation methods work only when the following apply:

- few very similar products are produced,
- indirect costs are low,
- production and conversion processes are homogenous,
- customers and marketing channels are homogenous,
- selling, distribution, and administration costs are not high.

Because of the above, pricing of products based on traditional costs methods may lead to losses when company produces customized products rather than mass-produced items.

The cost allocation in ABC is as follows:



Cost allocation to products uses cost driver that is the unit of an activity that causes the change of an activity cost. A cost driver is any activity that causes a cost to be incurred. Examples of cost drivers include machine hours for maintenance costs or number of orders received for cost of handling raw-material costs. The above shows that a company may use multiple cost drivers depending on business operations and activities undertaken. ABS process requires [9]:

- identifying activities and activity pools,
- allocating costs to activities and cost objects,
- calculation of activity cost drivers' rates,
- assigning costs to cost objects,
- calculation of production cost per item.

ABC system provides more accurate view of product cost than traditional costs system, as it determines every activity associated with producing an item and allocates cost to the activity. The cost assigned to the activity is then assigned to products that require the activity for production. Because of the described procedure, companies assign cost only to the products that require the activity for production. The great benefit of the procedure is elimination of allocation of costs that are irrelevant to a product.

Table 1
Basic costs data referring to product A and product B

	Product A	**Product B**	**Total**
Production volume [kg]	5 000	10 000	15 000
Direct costs - materials	20 000	16 000	36 000
Direct costs - remuneration	36 000	70 000	106 000
Direct costs - other	10 000	19 000	29 000
Direct costs - TOTAL	66 000	105 000	171 000
	Number of activities		
Indirect costs of material purchases	10 deliveries	20 deliveries	62 000
Indirect costs of production preparatory phase	20 hours	22 hours	38 000
Indirect costs of quality control	14 controls	18 controls	49 000
Indirect costs - TOTAL			**149 000**
TOTAL COSTS (direct and indirect)		**320 000**	

Table 2
Calculation of unit cost per activity

	Number of activities	Costs of all activities	Activity unit costs [PLN per activity]
Indirect costs of material purchases	30 deliveries	62 000	2 066.67
Indirect costs of production preparatory phase	42 hours	38 000	904.76
Indirect costs of quality control	32 controls	49 000	1 531.25
Indirect costs - TOTAL		**149 000**	--

Table 3
Allocation of costs (activity costs) to each product

Activity	Activity unit cost	Product A		Product B	
		Number of activities	Cost of activities	Number of activities	Cost of activities
Indirect costs of material purchases	2 066.67	10	20 666.70	20	41 333.4 ~ 41 333.3
Indirect costs of production preparatory phase	904.76	20	18 095.20	22	19 904.72 ~ 19 904.8
Indirect costs of quality control	1 531.25	14	21 437.50	18	27 562.50
			60 199.40	--	**88 800.60**
Indirect costs - TOTAL				**149 000**	

Table 4
Total costs allocated to each product

Cost type	Product A		Product B	
	Total costs	Unit costs	Total costs	Unit costs
Direct costs - materials	20 000	4.00	16 000	1.6
Direct costs - remuneration	36 000	7.20	70 000	7.0
Direct costs - other	10 000	2.00	19 000	1.90
Indirect costs of material purchases	20 666.70	4.13	41 333.3	4.13
Indirect costs of production preparatory phase	18 095.20	3.61	19 904.8	1.99
Indirect costs of quality control	21 437.50	4.29	27 562.50	2.76
Cost of production - TOTAL	**126 199.4**	**25.23**	**193 800.6**	**19.38**
		320 000		

Another advantage of ABC includes a greater understanding of overhead costs. Costs systems help companies determine the cost of a product related to the revenue it generates. The ABC system determines the cost of a product but it also improves information flow referring to production management, including efficiency, sources of expenses incurred, and identification of crucial activities within the company.

Required calculating steps in order to determinate a unit product cost when the company produces two goods is presented below. First, cost pools are presented for each activity. Information regarding total costs for each activity is collected periodically and should be based on resources used for each activity.

ABC system concentrates on indirect costs as it originated to overcome the shortcomings of traditional cost accounting. Properly designed ABC system does not perceive the company and its costs through organizational structure but prioritizes activities required in producing certain product. It enables better allocation of indirect cost due to the fact that it is based on a thorough understanding and describing real processes taking place in the company. Table 2 shows calculations required in determining the unit cost per activity.

It can be observed from the table above, that different allocation measures are used. It is of high importance to identify the factors determining the level of indirect costs and implement allocation key that allows for the best allocation of indirect costs. It can be also seen that activities are established for different levels of organization of a company. For manufacturing company, activities may be identified at the following levels:

- facility for any given product,
- for batch of products, i.e. machine setup,
- for level, i.e. activities of front office personnel.

Differentiating activities and their separate identification on various levels of company business operations assures that ABC provides more accurate product cost information than traditional costing systems. Indirect cost hierarchy is then illustrated in the unit cost of each product (Table 3).

The summary of all items forming unit cost for each product is presented in Table 4.

Activity based costing can drastically change how managers and engineers determine the mix of company's product line, how they arrange location for sourcing components, and assessment of new technology and products' development. In todays' changing business environment companies must adopt appropriate strategies in order to survive and flourish. On the other hand, developments in manufacturing and communication technologies (i.e. computerized manufacturing resulting in detailed information

referring to cost structure) have enabled to manage the product before it is manufactured. Upstream costs like research and development expenses, and product design or personnel remuneration expenses can be precisely estimated and it can be used in the decision-making process.

In addition, it is worth mentioning that ABC regards the relation between activities and resource consumption as linear, certain and absolute. This means that additional activities result in additional costs, and limitation of activities reduces the costs. Allocation of costs is to some extend arbitrary, based on key measures used in allocation process. Disadvantages mentioned above, together with periodical requirement of huge amount of information collection (cost of information), finally concluded in discarding ABC by many companies that previously adopted it. Nevertheless, for development of new product and planning of production process it may be of great use.

ADVANTAGES OF ABC IMPLEMENTATION IN NEW PRODUCT DEVELOPMENT

The ABC system provides more opportunity for identifying costs and measures of processes, in contact with product and the movement across functional structures in cost gathering. It may serve as a tool to determinate accurate quality costs including comparison of costs and benefits related to specific product, assortment of product or group of customers. Using financial measures together with non-financial performance measures decision-making process regarding new product development may be an element of operational or even strategic planning of a company.

Moreover, as product life cycles are getting shorter and shorter, ABC costing allows connecting new product development, changes within technology processes, and marketing approach with short-term operational business indicators. It is impossible when a company uses traditional costs systems only, as they are effective mainly in long periods of business operations.

Adopting ABC for new product development assures a proactive way of involvement of engineers, accountants, and managers in the planning process. In addition, adoption process is easier when compared to existing processes as – during development stage – a company can prepare in order to obtain all required information. As it identifies activity centers in organization as well as cost drivers and cost pools, in the next step engineers may use it to improve manufacturing operations, including improvement of product quality, lowering of production costs, and at the same time increase efficiency of operations and eliminate products that generate losses. As little difference in costs can influence engineers and managers' decisions regarding production management, identification of economic resources used in order to undertake different activities, and identification of the factors that are responsible for costs creation is of crucial importance in production management, including new product development.

It should be also stated, that as todays business doing is complex and uncertain in many aspects, new product development may be characterized by a relatively high degree of uncertainty. Because of the above, there is not one best way to perform new product development. Thus, there may be limits to the usefulness and applicability of ABC methodology. On the other hand, stating that precision and neutrality of accounting numbers may be of little value when plurality of interpretations occur, ABC based on activities performed in the company, would certainly lower the probability of too many interpretations. Analysis of costs through business operations with little regard to organizational structure or consumption of direct costs (for indirect costs allocation purposes) would allow prioritize technology and financial goals and optimize manufacturing and selling costs of a product. The above means that financial consequences of technical choices would not be ignored, and key performance indicators may be designed in order to evaluate the project.

CONCLUSIONS

Management accounting is a practice, which exhibits extensive and consistent change due to changes in business environment. In previous literature, management accounting change has been conceptualized as change in organizational rules and routines [2]. As organizational rules and routines, management accounting systems and practices stand between the organization of a company and the day-to-day actions and thoughts of members of the company. The above characteristics show that introducing ABC, even only in new product development decision-making process, requires changes on every level of a company. On the other hand, it analyses costs of projected product with little regard of organization structure prioritizing activities incurring costs allocated to finished goods. It can be deployed as an integral component of an organizational decision-making process in the field of new product development.

This theoretical research can be extended in several directions. Costs systems allowing for allocation methods are important tools for managers in new product development process. Experimental research or analysis of case studies may reveal details on how and on what stage of new product development process they can be used. Nevertheless, additional theoretical concepts are required to fully understand the possibilities of ABC usage in new product development process.

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