USING TOTAL COST OF OWNERSHIP AS A METHOD FOR IDENTIFICATION OF INTERNAL PROBLEMS IN PURCHASE AREA – CASE STUDY

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Abstract

Total Cost of Ownership (TCO) concept is a quite widely described method for selection and evaluation of suppliers. The literature on the subject brings a number of purchasing analyses in field of IT equipment, means of transportation or industrial appliances. This time the authors present a broader approach that goes beyond to date analyses. They focus on underestimated facet of the concept. A matter of interest is a discussion on internal processes in enterprise that impinge on TCO's deterioration. The aim of this paper is an attempt to prove that TCO can also be a measurable tool for identification of internal problems of enterprise. In this way its silo nature is shown and implications of lack of holistic approach are mentioned. This article presents a list of chosen processes' disruptions and their impact on TCO increase, e.g. additional transaction costs in an audited company. As demonstrated in the paper, the organisation itself can cause events that make its financial result worse. Thus, a few tools to identify and eliminate those causes have been introduced, creating a controlling mechanism. Understanding of this approach testifies to a level of organisation's maturity considering not only purchasing but also planning of entire business. Purchasing department itself emphasizes its strategic role. Relevant limitation is a way of financial settlement of core activity. Calculation of production costs takes into account only used materials and components. However, an excessive or redundant inventory becomes usually a cost at a later time. Barrier can be a wage regulation depending on profit margin instead of Activity Based Costing approach. Future research should focus on enlightening the TCO's idea and implications of its non-use.

Key words: TCO, identification of purchases problems, purchasing strategy, internal cost approach

1. INTRODUCTION

One of the areas, in which enterprises compete, is logistics (Harrison & van Hoek, 2010, p. 1). Logistics is based on the total cost concept (Waller & Fawcett, 2012). The scale and dynamics of development of the global economy favours disturbances of the same (Boyer et al. 2016). Even in times of crisis, it is in logistics that they see an opportunity to gain competitive advantage through, among others, searching for influence of logistics upon entry barriers such as economies of scale, product differentiation, capital needs, access to distribution channels, cost disadvantage or state policy (Jezierski, 2015; Shvartsburg et al. 2017). The fundamental approach connected with building of advantage by improvement of operating results from use of various activities related to management through quality (Merino-Diaz de Cerio, 2003). Kannan and Tan combine improvement of results of operating activities with just in time, supply chain management and quality management. The three approaches are dependent on one another. Combination of quality with dynamics of the supply chain has the greatest influence on success in business (Kannan & Tan, 2005).

Purchases as an element of the supply chain (Carter et al., 2015) may constitute a source of competitive advantage (Barney, 2012). This results from the current function of the department. Evolution of supply departments brought changes from a traditional model involving purchases of production means (Lidegaard et al., 2015) to supplier management (Bevilacqua & Petroni, 2010). Purchases tend to integrate even more with other functional areas of an enterprise – establishment of a strategy, marketing, supply chain management and entire enterprise management. Further development trends relate to sustainable and honest purchases following digitalization, risk management in the supply chain and purchases in the public sector (Mogre et al., 2017; Chan & Tih, 2017). This holistic approach gives a strategic meaning to purchases (Lawson et al., 2009; Partida, 2016).

Apart from the traditionally understood cost approach to purchases, we can observe a tendency to include Environmental, Social, and Regulatory (ESR) risks, which bring new categories of costs, risk and opportunities. Implementation of the risks in the strategy of purchases and enterprise as based on the Total Impact of Ownership approach may contribute to success of the entire enterprise (Spiller et al., 2015).

The concept of Total Cost of Ownership (TCO) is a widely described method of selection and assessment of suppliers. Its essence is to determine the total cost ("true cost", Ellram, 1995) of purchases of goods and services and not only the cost of purchase understood as a price included in an invoice received from a supplier or in a quotation (Ellram, 1993; Ellram & Siferd 1993; Degraeve & Roodhooft, 1999; Zsisidin et al., 2003). This is done by way of identification of all costs in the supply chain – cost drivers (Ferrin & Plank, 2002; Niranjan et al, 2014). These are (Ellram, 1993):

- pre-transaction costs – which include searching for and assessment of sources of supplies and inclusion of supplies in the supply chain,
- transaction costs – the purchase price, delivery costs, quality control costs,
- post-transaction costs – costs of defective products, returns and complain services.

In this context, TCO may be deemed realization of ABC (Activity Based Costing) method by calculation of all costs, which appear at acquisition and use of goods or services (Degraeve & Roodhooft, 2000; Wouters et al., 2005). A system constructed in such a manner is deemed a most effective method of making of decisions on purchases (Acharya et al., 2009). Ellram refers to TCO more as a philosophy than a method, because it creates for the entire enterprise, an opportunity to change its focus from price to thinking about all costs (Ellram, 1995). The literature on the subject includes a series of analyses in the area of purchases of IT equipment, transport means, industrial equipment and services. Table 1 presents selected applications of TCO.

Table 1. Chosen application of TCO and their key issues

Author	Area	Key issues
Blanks (1985)	Traffic signal equipment	Cost to the community arising from increased accident rate and traffic disruption due to malfunctioning equipment
Young et al. (1994)	Innovative cooking appliances	Relative cost in monetary and human resources of owning and using traditional and innovative residential major cooking appliances
Degraeve & Roodhooft (1999)	Supplier selection	TCO analysis offers cheapest supplier of heating electrodes
David et al. (2002)	IT equipment	2 ways of reducing IT costs allow IT departments to maintain both a low workstation TCO and a high level of end-user satisfaction.
Degraeve et al. (2004)	Services: airlines	First model that makes TCO operational in a service-purchasing context
Christin (2005)	Power protection	Considerable savings of a centralized UPS installation against distributed
Schillinger (2006)	Laser	New device for photolitography mask inspection cheaper due to innovations that enhenced lifetime and reliability
Prabhakar & Sandborn (2012)	Long life-cycle elec. systems	Better informed part selection and management decisions
Goudarzi (2013)	Video transmission	TCO must consider both CAPEX and OPEX
Klos & Trebuna (2014)	ERP implementing	TCO as a supportive tool in ERP implementation
Han (2014)	Electronic Theses and Dissertations	Electronic version reduced processing fee compared to paper version

Author	Area	Key issues
Landscheidt & Kans (2014)	Industrial robots	Robots as an alternative for low-cost countries
Wu et al. (2015)	Electric vs. conventional vehicles	TCO does not reflect how consumers make their purchase decision today. Discussion on policy measures that educate consumers about the TCO of different vehicle types
Kerdlap & Gheewala (2016)	Electric motorcycles	Implementing lithium-ion and lead-acid battery to meet motorcycle energy reduction
Mehta et al. (2016)	Hospitalization in total laryngectomy	Identification of subgroups of patients and reasons of longer stay in hospital
Lawson (2015), Pinfield et al. (2017)	Open-access publication	Costs of journal subscriptions (87%), open-access article-processing charges (12%), and new administrative cost (1%)
Lemathe & Suares (2017)	Different vehicle types	Subsidies support the competitiveness of BEVs, but fail to lead to favorable TCO within several vehicle segments
Hartman et al. (2017)	Manufacturing relocation	Collecting all needed factors of TCO for manufacturing relocation is a long-term task and charged with high risk of only partial data
Levay et al. (2017)	Fiscal incentives for elec. vehicles	TCO level dependent on fiscal incentives in each country
Palmer et al. (2018)	Hybrid and elec. vehicles	Market share of hybrids is strongly correlated with their relative TCO
van Loon et al. (2018)	Consumer products	Leasing vs. selling : additional cost of lease can be higher than savings from reuse of products and components

Source: own elaboration.

This is particularly important for purchase of goods in low-cost markets, where a low attractive price of purchase may "cover" bad quality, short guarantee, potential high quality control and complaint service costs and high delivery costs. Authors of this work can assess, from the point of view of their practice, that the stage of intoxication with very low purchase prices offered by suppliers from countries with low production costs. If the course of competitive advantage is the quality of final products, then the concept of total costs of purchase requires selection of an appropriate source of supply. The completeness of analysis of TCO from the point of view of costs is presented in Table 2.

Table 2. Comparison of TCO and other cost management approaches

Type of analysis	Scope of analysis	Management level
Analysis of price	Price and payment terms when purchased from supplier	operational
Analysis of cost	Production- and delivery cost	tactic

Analysis of TCO	Value for firm and client	strategic

Source: Ocicka, B. (2012). Zmiany w łańcuchach dostaw w świetle rozwoju zaopatrzenia z rynków niskokosztowych. Warsaw: Oficyna Wydawnicza SGH, p. 129.

Modelling of processes and calculation of TCO supports numerous software. The very website at www.ibm.com provides 13.986 search results for "total cost of ownership", suggesting, among others, solutions for "asset lifecycle management and maintenance management functionality that can help organizations improve asset life and lowers total cost of ownership" (IBM, 2018). On principle, the TCO has been used for B2B relationships. However there are some examples of B2C approach, where an end-user can find reliable cost price (Saccani et al., 2017; Fang & Rau, 2017).

2. CASE STUDY – PRODUCTION COMPANY

2.1. Assumptions for Analysis

It has been commonly assumed that companies make a relatively best choice in the process of purchase, using information available at a given time. Thus, the concept of TCO is an expression of an organization's maturity to manage its purchases (Milczarek et al., 2017). However, incompleteness of information causes that – as Sawik wrote - "The two types of disruption scenarios are considered: scenarios with independent local disruptions of each supplier and scenarios with local and global disruptions that may result in all suppliers disruption simultaneously" (Sawik, 2011).

Considering that the analysed example will relate also to import of goods from China, one should mention the concept of TCO from the point of view of sourcing and outsourcing from markets with low production costs. In both cases, an enterprise faces the necessity to perform a comparative analysis in conditions of incomplete information about cost drivers, which, however, it has to estimate. (Kamann, D. & van Nieulande, 2010; Platts & Song, 2010; Johnson et al., 2013). These may include (Kumar & Kopitzke, 2008):

- the manufacturability of the product (value engineering / value analysis),
- the manufacturing infrastructure requirements (the basic facilities, services, and installations, needed for the optimal functioning of the manufacturing operation),
- the structure of foreign and domestic tariffs/duties/taxes,
- the costs of transportation and the timeliness of delivery,
- foreign business/labor/environmental regulations,
- foreign political/economic stability,
- foreign currency exchange risk,
- language/communications requirements,
- volatility of end-customer demand and the responsiveness of the network to changes in that demand,
- inventory carrying costs (investment versus service levels),

- inventory risk (relocation, damage, obsolescence, shrinkage),
- quality costs.

What happens, if decisions are made as contrary to the current state of the art as regards cost drivers in purchases? Even if the case is a project purchasing, how should the risk management be settled after the project duration (Kähkönen, 2018)? Disregarding ethical issues, which are not the subject of this article, reasons for the activity should be considered, the place of its origination should be determined and tools should be found in order to avoid occurrence of the same in the future. The knowledge on management provides the whole list of tools for identification and analysis of problems appearing in the course of business activities conducted (Cyplik & Hadas, 2011; Wieczerniak et al., 2017). Is the answer indicated by the result of an experiment, in which experienced decision makers were less aware of financial consequences resulting from incomplete information about cost drivers as compared to students taking part in the same experiment (Morssinkhof, et al., 2017)?

It is the concept of TCO, to which the authors of this work contribute a substantial role and they consider implementation of the same in a company as a key tool both in the process of selection of a supplier (Milczarek et al., 2017) as well as in the pursuit of identification of internal problems of an organisation disclosed owing to analysis of TCO. From the point of view of the analysis character TCO is to fulfil a preventive role in to replace a reactive role.

2.2. Company and Failures

This family company that deals with designing and manufacturing of multinodular electronic devices for local and foreign B2B customers such as retail networks. It offers several product lines and a few basic models in each of them. The models are available in numerous variants (up to a few dozen), which results from the need to tailor both recurrent and unique solutions for customers. From the point of view of BOM (Bill of materials), a common part of the variants is plastic enclosure and universal cable connectors and power devices. Items imported from China have a significant share in the same. There are differences in PC boards and their components, electric cables and mechanical elements. Tailoring of the variants entails short production series. Therefore, most of electronic components are bought from local suppliers, who offer short lowest MOQs (minimum order quantities). Another reason for the multitude of versions of PC boards and their components is the willingness to follow technological progress in electronics and the need to "lean" the structure in order to reduce the price of production due to growing competition in the form of ready-made solutions imported form the Far East. The company aims to be a leader as regards quality and catch up with price leaders, which also entails specified activities. Leaning is also favoured by a commission-based system of remuneration for employees responsible for sale. It is calculated as based on a simple relation between the sale price and production price constituted by nominal costs of purchase and costs of production.

What is the purchase department like in the context of TCO? The manager for purchases offered and implemented the concept of 7 steps to change of the purchase strategy of the enterprise. (Milczarek et al., 2017). One of the tools indicated included

TCO method replacing the owner's previously used principle of "purchase price = purchase price + transport + customs (in case of import) ". In the course of multidimensional analysis of the company's activities, a high level of awareness of employees of the purchase department as regards the essence of TCO was shown. There were no problems with transfer of the knowledge to the company's other departments and there are still some imperfections. Table 3 shows the company's assumptions, which have a significant impact on the philosophy of TCO.

Table 3. Chosen assumptions of firm's strategy and their leading impact on TCO

Assumption	Description	Main impact on TCO
Insourcing	Produce instead of buy	Many detailed activities in various areas of sourcing
No-stock policy	Big excessive stock from former years	Numerous and small purchases for order
Tailoring solutions	Solutions adjusted to each specific need of client	Re- and design cost, testing, small purchases for unique orders
Global penetration	Price approach	Quality and import issues
Focus on manufacturers	Cooperation only with manufacturers	Worse terms of cooperation than from agents due to small quantities

Source: own elaboration.

The company conducts very dynamic activities in the area of implementation of new models and variants of products. Initially, every implementation relates to the design, as it is initiated by demand of the market. This means working under the high time pressure and little margin for technical errors and delays. What is more, retailers do not have to supply sale forecasts and, therefore, every transaction is burdened with a risk connected with availability of material and components. In connection with such a diversified range of goods and unforeseeable sales, the company owner implemented a policy of purchase on orders and allowed for maintaining of specific stock levels of components and "bottleneck" semi-finished products, which are strictly calculated on a weekly basis. An additional burden is a large stock of unsuitable for use and obsolete components as effects of long-year negligence. An organization constructed in this manner is a great challenge for the purchase department. There are several negative consequences for the department.

Firstly, absence of sale forecasts and production means worsening of a position in negotiations towards suppliers. Secondly, sometimes shortages of stocks mean „extinguishing of fire". Thirdly, as regards of purchases, even from long-standing and long-term suppliers, there are mandatory MOQs, which entail purchases in quantities often greater than needed. Fourthly, almost unlimited access to information about resources (e.g. by Internet) for all persons interested, entails a crop of calculations of costs of production of a new product, which disregards the substantive contribution of the purchase department. This leads to a situation, in which, despite the flat organizational structure of the company and theoretically easier exchange of information between its units, operating activities are separated and the units compete in the context of „better" knowledge: „I know better, I have seen it on internet auction". Sixthly, pressure connected with the need to perform an order/project causes

that everyone is interested in quickest possible performance of their share. Consequently and seventhly, a key factor in the entire situation is the process of initiation, implementation and calculation of new products as well as changes in BOM for available range of goods. Table 4 shows the breakdown of responsibilities for particular stages in the process of creation of a new product or modification of the already existing product.

Table 4. RACI responsibility matrix in new product development process and in modification of current product

	Board	**Sales**	**R&D**	**Purchasing**	**Production**	**Quality**
New product idea / modification idea	**RACI**	**R**	**I**	**I**	**I**	**I**
Details of idea	**R**	**I**	**C**		**I**	**I**
Production cost's calculation	**RACI**		**C**		**C**	
New design / redesign	**RACI**	**R**	**C**		**I**	**I**
Sourcing new components	**RA**		**R**		**I**	
Testing after change	**RA**	**RA**	**RAC**		**I**	
New BOM	**A**		**RC**	**I**	**I**	
Purchasing new components	**A**		**AC**	**R**	**I**	
Run new production	**A**	**I**	**I**	**I**	**R**	**I**
Quality control of ready good	**A**	**I**	**C**		**I**	**R**
Responsible R	6	3	3	1	1	1
Accountable A	9	1	2	0	0	0
Consulted C	3	0	7	0	1	0
Informed I	3	3	2	3	8	4
Sum	**21**	**7**	**14**	**4**	**10**	**5**

Source: own elaboration.

Apparently, a centre deciding on launching of the change process is, most of all, management board. What is more, this applies to decisions not only on a strategic level of the concept, but also on the operating level and usually includes the components, which are to contribute to accomplishment of the change target. Tactic tasks may be left to the purchase department, however, as a result of the already established strategic and operating limitations they lose their meaning and become unfeasible. The change in functionality as planned by the management board entails necessary selection of yet other components or designing of a brand new solution. Obviously, the R&D department is responsible for the operations. The department selects electronic components for a prototype and trail production from an offer of suppliers included in a catalogue or from samples of new products received from sales

representatives of the companies or companies that are competitive to the same. However, one has to bear in mind that new products sometimes enter into regular sales only after several months from presentation of the same. To base the now-needed solution on the new products is highly risky. Mechanics components are searched for in resources of various types of distributors of the range of goods, DIY stores (do it yourself centres) and specific stores for various applications. Sometimes an element selected for a prototype is offered by only one supplier and the quantity is very limited, which the R&D department usually does not take into account. Why? The approach of R&D to the issue may prove absence of awareness of consequences of the activity.

A separate category includes purchases from accidental sellers on internet auction websites. Despite no time for reliable penetration of the market and checking of samples, the relation between their usable value and low purchase price was so significant that the management board decided to bear the risk of such purchases. In this case, the company experienced absence of recurrence of quality of items ordered several times, which, in case of nominal small value made it senseless to lodge a complaint. Samples and even larger batches of goods were usually rejected and purchases were made from proven supplier in the local market at much lower prices and within a longer period of time.

The not fully completed design of a new product may end up in a failure even in case of cooperation with an approved supplier from China. In this case, there were also situations involving disposal of the entire batch of components and inclusion of the same in general costs of the company's activities not only due to the fact that the management board made too quick decision on ordering the components for a design that had not yet been completed.

Another category is notorious replacement of the previously used components or materials with a new and cheaper material in the period of use of stocks of the replaced materials ("the production will be cheaper"). Aiming at the activity results from principles of the current commission system for all persons receiving remuneration for sales. It should be remembered that a commission is due on a difference between the price of sale and nominal price of production, which, however, does not include components purchased for the purposes of a design, which, however, have not been used in the design. As regards absence of recurrence in case of some orders, costs of production calculated as above as well as margins can be burdened by errors. The company applies an ABC cost account at the stage of acceptance of goods in a warehouse, but sales (production orders) are settled in accordance with the quantity of materials and components currently used in the process of production of a given item included in the range of goods. Thus, excessive stocks are left in a warehouse and the purchase department has to account for the same.

Table 5 presents a list of selected cases of interferences with the idea of TCO in the audited company.

Table 5. Chosen deviations from TCO philosophy

Category	Description of deviation
Flagship product	Lean activity - change of BOM during production of big order after all components purchased and at stock

Category	Description of deviation
Flagship product	No ABC approach - sorted out components remained at stock, never used after change
New product 1	No life cycle projecting; no market research before launching; components remain at stock
New product 2	Redesign required due to insufficient preproduction tests; few components for scrap
New product 2	Crucial and cheap component from internet stores failed regularly (for scrap); expensive replacement required
New product 3	Redesign required due to overcomplicated machining after first batch of components at stock
Supporting device	Price calculation for client based on price of internet store; all samples failed; result: local and more expensive replacement
Component	Price calculation for client based on price of internet store; price didn't include necessary equipment
Trade good 1	Price approach despite low supplier evaluation; long lead times and delayed deliveries
Trade good 2	New model implemented before former sold out; storing and scrap

Source: own elaboration.

2.3. 5-stage method of TCO implementation

The described situation in the purchase area required an analysis aimed at identification of problems with the use of TCO concept. The research covered 95 purchase proceedings relating to a new production project or new goods throughout 12 months.

The first stage of analysis of the problem was to define cost drivers caused by the organization itself. Next, the scope of occurrence of the costs drivers was calculated. Then, the drivers were divided according to divisions, in which they originate. The researchers came across a difficulty in unambiguous ascribing of a given driver to the company's specific unit due to the specific distribution of competences. Thus, for example, a decision on withdrawal of a component from production was included in competences of the management board, whereas such a decision usually is to be made by a technologist of R&D department. What is more, the approach focusing on the lowest purchase price also relates more to the management board than to the purchase department. The obsolete and excessive stock of old components, which has a significant impact on other drivers resulting from the sample, e.g. no-components stock policy, was considered as a problem not relating to the tested sample, but, still, a fundamental problem from the point of view of the entire analysis. The total of observations did not amount to 100%, as there were more cost drivers at the same time. Results of the analysis are presented in Table 5.

Table 5. Observed cost drivers by departments and frequency of occurance

Department	Cost driver	Frequency (%)
Board	No life cycle projecting	100

Department	Cost driver	Frequency (%)
	No TCO approach	97
	Price approach	93
	System of imperfect performance-related bonus for sales team	87
	Lean decisions during production process when stock available	27
	No-components-stock policy	8
	Scrap	5
Purchasing	Big transactional cost (small and frequent purchases)	91
	Limited chance for strategic and tactical approach	83
	Express shipments	59
	Cost of prepaid goods	55
	Quality complaints to foreign suppliers	11
	Risky stocking at suppliers	10
	No subcontractors for short-series special components	8
R&D	Little versatility of components	62
	Fast changing BOMs due to tailoring solutions	46
	Redesign cost	39
	Obsolescence	9
	Using accidental components	7
Sales	No sales forecasts	100
	Tailoring solutions & multiplication of SKU	68
	No TCO approach	49
	Transaction cost (sales from 1 pc.)	23
Production	Rework	24
	Risky stock of semiproducts for many of variants	19
	Production waste	4
Warehouse	Frequent deliveries of small quantities	91
	Obsolete and excessive stock of components from former years	-
QC	Needed 100% quality control of imported goods	81
	Complaints processing	27
	Scrap	2
	Additional quality tests by external institutions	2
Service	Rework/reinstallation	6

Department	Cost driver	Frequency (%)
Bookkeeping	Processing of many low-value documents	68
	Prepayments (mainly for numerous little Chinese suppliers)	55

Source: own elaboration.

In the **second stage** activities were undertaken, which, within a short period of time, made it possible to reduce the number of negative observations and the reporting module in ERP corporate system was adjusted to ABC standard. Simultaneously, in the **third stage**, it was found that the identified internal drivers showed interdependence. Based on the above, it was possible to identify main causes of the interdependence, combining most of the observations and causing disturbance within the purchase area. These included:

- price approach,
- no sales forecast.

Acting for the purposes of providing details of the analysis, as early as **in the fourth stage**, it was decided that department managers would keep a register of events in their departments that deviate from some subjective standards in accordance with the below pattern:

- process/project,
- stage,
- cost name,
- cause,
- estimated value,
- suggested method of avoidance in the future.

It was assumed that, initially, the register would be submitted to the Purchase Manager every two weeks and, afterwards, every month. Processed data would be submitted to the management board and managers in the form of a report. This form of activity would constitute a basis for identification of detailed targets with the following three dimensions as part of **the fifth stage**:

- qualitative – may cause the growth of awareness of those involved as regards a wider perception of TCO generated in processes and projects supervised by them,
- quantitative – build indexes of deviation of TCO and establish admissible levels for each group of problems and cost drivers and determine timeframes for accomplishment of the same; within 1 year it is expected that the numer of disturbances of TCO will drop by at least 50%,
- control – a current analysis of internal problems reported in the context of TCO has to include also external factors.

3. CONCLUSION

An initiative relating to presentation of strong points and implementation of TCO concept should belong to a representative of the purchase department. It is in the

purchase department that both positive and negative phenomena occurring in the organization accumulate and have an impact on its effectiveness and efficiency. The quality of input information is usually verified before it gets outside. However, restrictions on the part of creators and suppliers of information can deform the message to a great extent, resulting in measurable costs for the organization. Sources of restrictions can be found among traditionally perceived cost drivers, however, the economic reality also brings problems resulting from numerous imperfections such as those in the sphere of internal communications within the organization. Confrontational relations among the organization's departments are based on its various targets and provide a perfect example of a cost driver creating a problem for the purchase department. The philosophy of TCO provides a range of ideas to solve and avoid the same in the future.

Identification of cost drivers in purchasing brings basic impression on direct interdepartmental linkage within processes. They refer directly to the concept of 7 steps of change in the purchase strategy (Milczarek et al., 2017), in which they play an important part on the way to section of a supplier. This article became a future research for the aspect of that concept and indicates a wider field for use of TCO. In the presented example, cost drivers were analysed with respect to other aspects. Contrary to usually used criteria, in this case, the authors focused only on identification of internal causes of the growth of TCP, which result from problems within the organization itself. The applied division of drivers according to organizational units makes it possible to identify problems. However, the authors have observed an express cause and effect relationship between the above, which often renders uniform interpretation impossible. Therefore, it is of key importance to name and fully describe the same. A particular challenge is always to indicate a field for improvement in the sphere of management by top management.

The presented case study relates to a company, which is successful in its market. Despite indicated problems in the sphere of purchase, the company creates a value for its customers and overcomes numerous difficulties effectively in its everyday activities. However, it does not overcome all of them. The observed cost drivers in the field of purchases constitute a challenge for the entire organization and, at the same time, a great opportunity to improve its effectiveness and they also influence the growth of the financial result.

The performed analysis of activities with respect of TCO showed 2 main problem areas, which are underlying causes of any other cost drivers and problems caused by such cost drivers. It should be added that a cost driver itself is a very natural category. However, its consequences can go far beyond the sphere of deliberations relating to selection of a supplier. This is what we have observed in the audited enterprise. The philosophy of TCO understood widely in that case can be an excellent tool for identification of problems in the sphere of purchases, which also derive from other fields of the company's activities.

The 5-stage method of implementation of TCO concept has an applicative potential. It has been implemented successfully in the audited enterprise. As early as in the second stage, positive changes were observed in nearly all functional areas. The changes related both to thinking of the management board, R&D department and sales, which is probably the greatest success ever achieved. The essence of the applied

method is not only to record deviations from a standard, but, first of all, make all stakeholders aware of significance of the entire issue. Understanding of the aspect breaks all barriers between the company's departments and leads to more effective communications. The first deviations recorded were included in a register in a rather irregular and inaccurate manner and the greatest challenge was to provide an estimate valuation of a deviation. This required learning about the entire structures of process costs. We should add that ABC account of activities applied in TCO makes it possible, for example, to compare variants of TCO in a version before and after TCO. Assumption of other approach does not provide a complete image of the situation to the company and it may lead to further erroneous economic decisions. Introduction of the discipline in the audited enterprise should result in decrease of events observed down to the initially planned level. Total elimination of problems identified in the course of the analysis according to TCO seems impossible, as the company has a limited influence on some cost drivers. Moreover, the design character of the activities has to consider some error margin both in the sphere of designing, management and purchases.

TCO should play a preventive role instead of reactive role. The organization's task should be to use the philosophy in order to identity problems before they occur. In connection with interdependence of the processes, TCO offers an opportunity to track the course of the processes and identify cost-generating bottlenecks. Such an analysis strengthens the position of the purchase department as a department creating a value for the company not only in the form of limitation of purchase direct costs, but also in the form of activities showing good practices and improving processes and designs within the company.

The fundamental aim indicated by the authors of this paper is to promote use of TCO as a method of identification of problems in the sphere of purchases. Observations made in several other units show that the concept has not been widely used yet and there is a huge amount of ground to make up in this respect. Its main advantage is its opportunity to identify cost drivers and problems often signalled by the same. Moreover, TCO touches upon, co far unmeasurable, issues and unidentified problems, which, for various reasons, were not included in calculations of costs. Simultaneously, TCO becomes a practical expression of ABC account of costs of activities. From the point of view of the purchase department, the fact of implementation of the concept should be considered as a success. This means that convincing of a lot of persons to perceive costs generated during activities conducted to the fullest extent justified selection of an offer that is most advantageous not only as regards the purchase price, but, what is most important, it makes it possible to find problems resulting from absence of a holistic approach to costs and emphasizes its strategic role in the organization.

Therefore, future research may focus on several trends of activities. Firstly, it is necessary to make aware all participants of trading of advantages of the concept of TCO and its significance for identification of problems in the sphere of purchases. The other issue is development of the presented method by building of qualitative and quantitative mechanisms of control of processes in order to find unavoidable problems early. The third issue involves mutual penetration of the currently known tools for finding of problems in purchases and determine their character with respect to the

moment, in which a problem was found. TCO may prove an important link in this approach.

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