PRACE NAUKOWE
Uniwersytetu Ekonomicznego we Wrocławiu

RESEARCH PAPERS
of Wrocław University of Economics

Nr 441

Global Challenges of Management Control and Reporting

Publishing House of Wrocław University of Economics
Wrocław 2016

Copy-editing: Marcin Orszulak
Layout: Barbara Łopusiewicz
Proof-reading: Barbara Cibis
Typesetting: Agata Wiszniowska
Cover design: Beata Dębska

Information on submitting and reviewing papers is available on websites:
www.pracenaukowe.ue.wroc.pl
www.wydawnictwo.ue.wroc.pl

ISSN 1899-3192
e-ISSN 2392-0041

ISBN 978-83-7695-596-4

The original version: printed

Publications may be ordered in Publishing House:
Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu
ul. Komandorska 118/120, 53-345 Wrocław
tel./fax 71 36-80-602; e-mail: econbook@ue.wroc.pl
www.ksiegarnia.ue.wroc.pl

Printing: TOTEM

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Introduction

Contemporary management control and reporting both face challenges. Consequently, a new and more sophisticated scientific approach is needed. From one point of view, interdisciplinary studies and theories are necessary. From another point of view, empirical research and practical issues call for a more specific and specialized approach. This complexity is reflected by the content of this book, which covers topics that emerge from present world's complexity. Therefore, the authors focus on ever-important issues (such as the strategic approach and its support by management control and reporting, survival of companies), and more modern issues (e.g. cultural aspects, measurement and reporting adjusted to branches, spheres and organizations and specific issues of management control and reporting).

The strategic approach to managerial control and financial statements and their role for company's survival is presented in papers by J. Dyczkowska (who addresses the question whether annual reports communicate strategic issues and focuses her study on reporting practices of high-tech companies), A. Bieńkowska, Z. Kral, A. Zabłocka-Kluczka (who explain the role of responsibility centers in strategic controlling), P. Kroflin (who explores the value-based management and management reporting examining impacts of value reporting on investment decisions and company value perception) and A. Reizinger-Ducsai (who discusses bankruptcy prediction and financial statements). The problems of management control and reporting and their adjustment to specific conditions and organizations are undertaken by T. Dyczkowski (who introduces his NGO performance model), Z. Kes and K. Nowosielski (who present the case study of the process of cost assignment in a local railway company providing passenger transportation services), S. Łęgowik-Świącik, M. Stępień, S. Kowalska and M. Łęgowik-Małolepsza (who analyse the efficiency of the heat market enterprise management process in terms of the concept of the cost of capital), and M. Pietrzak and P. Pietrzak (who discuss the problem of performance measurement in the public higher education). The cultural aspect of managerial control and reporting is explored in papers written by M. Nowak (who presents cultural determinants of accounting, performance management and costs problems showing the issue from Polish perspective using G. Hofstede and GLOBE cultural dimensions) and P. Bednarek, R. Brühl and M. Hanzlick (who provide a literature overview of planning and cross-cultural research). The specific problems and concepts of managerial control and reporting are investigated by M. Ciołek (who discusses the lean thinking and overhead costs), E. Nowak (who analyses the role of costs control role in controlling company operation), Ü. Pärl, R. Koyte,

S. Näsi (who examine middle managers' mediating role in MCS implementation), R.L. Sichel (who discusses the relevance of intellectual property for management control), J. Paranko and P. Huhtala (who analyse the productivity measurement at the factory level).

Marta Nowak

PRACE NAUKOWE UNIWERSYTETU EKONOMICZNEGO WE WROCŁAWIU
RESEARCH PAPERS OF WROCŁAW UNIVERSITY OF ECONOMICS nr 441 • 2016

Global Challenges of Management Control and Reporting ISSN 1899-3192
e-ISSN 2392-0041

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THE LEAN THINKING IN OVERHEAD COST-CUTTING

LEAN THINKING W CIĘCIU KOSZTÓW OGÓLNYCH

DOI: 10.15611/pn.2016.441.03
JEL Classification: D24, M12, M41

Summary: This paper addresses the problem of administrative overhead costs reduction, showing possible results that can be obtained with an application of value engineering tools and the Mudge Diagram in particular. Its objective is to investigate uses of this technique in rearranging structure and costs of internal administrative functions to lower the overhead costs while preserving value and functionality of company's administrative support at the same time. In order to identify and analyze the possible applications of this technique, an essential literature review was carried out. As an example of the use of the Mudge Diagram in the identification of the opportunities for value preservation, cost reduction and calculation of the potential results of such a systematic approach, human resources department was analyzed. An appriopriate simulation was performed in order to present the possible patch of application.

Keywords: lean thinking, value engineering, Mudge Diagram, overhead costs.

Streszczenie: Niniejszy artykuł poświęcono problemowi redukcji kosztów ogólnych funkcji administracyjnych realizowanych w przedsiębiorstwach za pomocą narzędzi stosowanych w działaniach związanych z inżynierią wartości, a w szczególności za pomocą diagramu Mudge'a. Jego celem jest zbadanie możliwości rearanżacji struktury kosztów dedykowanych określonym funkcjom i ich docelowemu obniżeniu przy zachowaniu wartości tych funkcji dla odbiorców. W tym celu przeprowadzono analizę wybranych pozycji literaturowych, która miała dostarczyć informacji na temat możliwości aplikacyjnych wybranych technik inżynierii wartości. Jako przykład ukazano możliwość wykorzystania diagramu Mudge'a do obniżenia kosztów ogólnych przedsiębiorstwa przy jednoczesnych zachowaniu wartości i jakości jego wewnętrznych funkcji administracyjnych.

Słowa kluczowe: *lean thinking*, inżynieria wartości, diagram Mudge'a, koszty ogólne.

1. Introduction

Lean thinking which is a broad concept of efficiency and productivity related to the manufacturer's environment has been also adopted in many other business sectors to improve their processes for example in the Toyota Production System [Morgan, Liker 2006]. Originally the primary goal of lean orientation has been an absolute waste elimination and high efficiency gain in the production process. Implementation studies have proven results enhancement in the manufacturing sector and in supply chain in particular. However, the lean thinking concept has been challenged to continue to give good results not only in the production process, but also in the development phases. In such a context multiple value engineering (VE) tools and methods appear to be useful not only in achieving a lean product development process with the objective of the highest product usefulness incorporating clients' values, perspectives, wants and needs at the lowest possible cost, but also in creating administrative processes that would support six primary business functions of a value chain and generate significant amounts of overhead costs.

Facing the growing competition over recent decades, companies sought to create higher value not only of their products, but also of their internal business functions such as accounting and finance, human resources management and information technology. Unlike direct and indirect production costs, which are incurred in order to create tangible value for customers, most of overheads are a result of internal business functions that need to be delivered to support company's existence without any additional value for consumers. Most recent research show that even high production cost can be justified and accepted by consumers when they find its contribution to supreme value for them [Sánchez-Fernández, Iniesta-Bonillo 2007].

Therefore, relatively high direct and indirect manufacturing costs may not be a significant issue for management. However, global competitive markets push margins down and force companies to cut overhead costs which, consequently, can affect the quality of multiple administrative functions that are essential for company's existence. Any major disruptions in those functions may result in severe operational and financial threat. Therefore, any step taken in order to reduce the overhead costs must include actions designed not only to lower those costs, but also to preserve or even enhance the value of internal business functions as well.

2. Value engineering

Originally the value engineering concept appeared in the period during and immediately after the Second World War, when exhausted American economy suffered from the lack of materials, workforce and efficiency in production. General Electric commissioned one of its engineers, L.D. Miles, to explore methods of substituting materials, construction techniques, reducing manufacturing times and costs without reducing products' functions and quality [Miles 1989]. In December

1947 his work known as the Value Analysis was finished. It introduced a new approach that let productivity be improved and costs lowered. In his later work, L.D. Miles transformed and applied the outcomes of the process.

Modern definition of value engineering was proposed by Cooper, Slagmulder [1997], who consider this term as a systematic and multidisciplinary examination of factors that decomposes product cost to identify reasonable ways to reduce costs without jeopardizing its functionality and quality. It underlines the importance of developing products and services not only in terms of their quality, but also within the appropriate cost related to their functionality consistent with customer values. These three characteristics were denominated as the “survival tripod” by Cooper [1995] and later by Cooper, Slagmulder [1997]. In order to achieve market and financial success, companies should balance this tripod in accordance with consumer requirements and the company strategy, mission and goals. These authors also suggest that the correct term that should be used in value engineering is “cost management” instead of “cost reduction.” The latter simply implies the expected reduction in both costs and functionality of products or services, while the real task is to provide exactly the same function with better quality, but at lower cost [Ibusuki, Kaminski 2007]. Value engineering appears to be a fundamental part of the target costing strategy as the tool that provides costs reductions through analyzing and working out the functions of products or services. Moreover, it is an intelligent cost reduction technique through “best value for money” concept [Lin, Shen 2007]. Such an approach guarantees that products or services represent their basic functions and essential characteristics of good quality and at an acceptable cost or a target cost, from the client’s perspective of value.

Value engineering methodology and tools can be applied in multiple fields, in particular in the product development process and project design but also in company’s internal administrative process through which various services for other units and subunits are provided. In practice, the design phase is ideal for using value engineering tools mainly due to the fact that 95% of the product or service costs are already committed there [Cooper, Slagmulder 1997]. Nevertheless, while every process or structure can be redesigned, the use of value engineering methodology and tools at any stage of the process is justified.

2.1. Value and target cost in the context of company’s administrative functions

The use of value engineering methodology and tools may arouse concern in terms of proper performance measurement. Each value engineering technique should provide cost reduction, which is a measurable parameter, and preserved or enhanced value, which, in most cases, is an immeasurable parameter. The problem is that the performance evaluation must consider both aspects. From this point of view, it is important or even essential to conceptualize clients’ value or, more generally, product or service recipients’ value, which basically encompasses two perspectives in this context. Regarding the company’s internal administrative process through which various services are provided, two kinds of recipients of such services, whose perspectives must be fulfilled, should be identified. The first one concerns those who represent the company that is making profit from enterprising (a company) and the second one concerns the company's units and subunits that effectively are direct recipients of the services provided through administrative process. In most cases, these two perspectives are contradictory. On the one hand, the company as a whole wants to reduce overhead costs to increase profitability and, on the other hand, units and subunits of this company, which are direct users of provided administrative services supporting their work, require quality and value. That usually leads to an excessive gain of overhead costs. To reach the balance between these two different perspectives, the value engineering tools are used to analyze and modify the structure and functions of administrative units in order to reduce the overhead costs, but with orientation toward the recipients' value.

At this stage, it is necessary to modify the definition of "target costing," which is commonly associated with the designed product or service. The classic definition of target-costing involves, basically, product planning in order to satisfy customer expectations and generate profit for a company, given the market requirements [Yoshikawa, Innes, Mitchell 1994]. This information is essential for the product cost to be considered an active variable. However, internal complex administrative services provided through administrative function may be hard to evaluate, given the market requirements, as they are not provided for external subjects. Taking that fact into consideration, one should understand target-costing as administrative function planning so as to satisfy the needs and requirements of units and subunits performing a sequence of primary business functions through a value chain [Datar, Rajan 2012].

2.2. Implementation stages

The implementation of an approach presented in this paper along with the determination of the internal administrative functions target-cost involve ten steps according to the research of Crow [1999]. In order to fulfill the paper's objectives, these steps were modified as described below.

1. Re-orient culture and attitudes. The first and most important stage is to re-orient thinking toward priority-driven pricing, prioritizing internal administrative functions attributes as a basis for administrative services that support function development. This is an essential change of an attitude in most companies where overhead cost, including administrative overhead, is the result of organizational structure rather than one of company's internal requirements.

2. Establish a priority-driven target structure of administrative functions. A target organizational structure of administrative units and subunits needs to be established and based on prioritized requirements along with the demand for essential internal administrative functions as well as internal administrative functions that derive from a company positioning in the market place (market-share), a market penetration strategy, competitors, a targeted market-niche and the elasticity of demand.

3. Determine required scale of administrative cost reduction. Once the priority-driven target structure of administrative functions is established, the target overhead cost of administrative functions should be calculated by subtracting the current operational profit from target operational profit.

4. Balance required reduction in overhead cost of administrative functions with its priority-driven target structure. Before the target administrative overhead is concluded, internal administrative functions requirements must be considered. The proper setting of requirements and specifications is the greatest opportunity to control administrative function costs. This requires a careful recognition of company's needs, the use of conjoint analysis to understand the value that company's units and subunits place in particular administrative functions and the use of techniques such as quality function deployment (QFD) to help make these tradeoffs among various administrative functions requirements, including its target overhead cost.

5. Establish a target administrative overhead costing process and a team-based organization. A well defined process must integrate activities and tasks to support reaching the estimated target-cost of administrative functions, be based on early and active consideration of target overhead cost, and incorporate the tools and methodologies described subsequently. Furthermore, a team-based organization is required in order to integrate essential units and subunits which benefit from administrative processes.

6. Generate ideas and analyze alternatives. The greatest opportunities for any overhead cost reduction lie in the multiple alternatives of administrative functions concept and the design of supporting staff organization structure on each stage of the services providing processes. The opportunities can be seized when there is creative consideration of the alternatives coupled with structured analysis and decision-making in a company.

7. Establish administrative functions cost models to support decision making. Administrative functions cost models and cost tables provide the tools to evaluate the implications of multiple concept and functionality alternatives. At the early stages of the reengineering process, these models are based on parametric estimation or analogy techniques. As administrative functions and the way they are provided become more explicit, these models are based on value engineering or bottom-up estimation techniques (reverse engineering). They need to be comprehensive to address all of the proposed services and support processes, assuring reasonable accuracy, quality and functionality.

8. Use proper value engineering tools to reduce costs. Most of the tools and methodologies related to design for manufacturing and assembly (DFMA) as well as value engineering or function analysis may be employed in administrative overhead costs reduction process with similar effects.

9. Reduce non-value added administrative functions and its indirect costs. Since a significant portion of administrative function's costs is indirect, a company should address it by examining these costs and re-engineering internal administrative

processes in order to eliminate functions served through multiple services provided by administrative units that do not create any value for other units or a company as a whole.

10. Measure results and maintain management focus. Current estimated cost needs to be tracked against the target administrative overhead cost throughout the whole reengineering process. Management needs to focus on the target cost achievement during implementation and phase-gate reviews to convey the importance of target-costing to an organization.

2.3. Used VE tools

Value engineering operation is attained with the use of various tools that provide a detailed analysis of a given object or process and collect indispensable data. After considering their potential for detailed analysis of the internal administrative process, the present paper adopted the following value engineering tools:

Function Analysis (FA): Function Analysis is the most important value engineering technique widely described by Dell'Isola [1997] and also by Cooper, Slagmulder [1997]. Its classic form consists of detailing the product under study to identify functions, classify them and associate their costs under the adopted component level criteria [Spaulding, Bridge, Skitmore 2005]. The analysis itself can be easily adopted to identify and classify functions of an internal administrative process that occurs in every organization and associate costs to such functions. The object of such an analysis can be easily switched from product to administrative service without any limitations and loss in quality and usefulness of obtained data. The functions indentified through FA are characterized by two words, a verb and a substantive. For example, the function of management accounting can be "to report data". According to Miles [1989], functions should be classified as follows: I. basic functions (BF) – those that represent the specific function of the object (administrative service), II. secondary functions (SF) – those that are part of an object (administrative service) but are not directly related to the basic function [Cooper, Slagmulder 1997] and secondary necessary functions (SNF) – that correspond to those required by regulations, laws and standards.

FAST Diagram: Function Analysis System Technique, known as FAST Diagram, was developed in 1964 by Charles Bytheway. The objective was to introduce a visual tool depicting schematic relationship of dependencies between the functions that were previously classified by Function Analysis [Borza 2011]. In order to create a FAST Diagram a dedicated multidisciplinary group of representatives from different areas should discuss and analyze services provided through internal administrative process and functions of the process, from different points of view, and develop the diagram's logical representation. The main objective is to obtain detailed information by stimulating ideas and solutions that can be implemented as a part of internal administrative services redesign process. It is usually required that an experienced value engineering facilitator guides group meetings. The reason for this is that at this stage of a process the discussion and analysis generate a large number of ideas among which only a couple are innovative and useful and others appear to be irrelevant [Mao et al. 2009]. As a result of a group's work, a flow chart is created which shows relationships between functions of an object or a group of objects and proposed solutions.

Mudge Diagram: the Mudge Diagram also known as the Mudge Technique shows numerical relations with pair to pair functions comparison of an analyzed object [Ibusuki, Kaminski 2007]. The scores presented in the diagram are assigned by the comparison of the importance between two pairs of functions. There are different weight scales used to show the relative importance of each function by means of a numeric evaluation. In the present paper, the following scale has been adopted: 1 assigned to a less important function; 2 assigned to a significantly important function; and 3 assigned to a very important function. An alternative scales can be found in different VE studies [Ibusuki, Kaminski 2007]. The objective of this comparison is to determine how each function relates to the complete system so as to investigate which is of higher importance. The obtained results make it possible to prioritize the relevance of each function in order to enable the analysis of their inter-relationships as well as to eliminate the functions that are dominated by other functions.

CPR Method: The CPR method is widely used to summarize the results obtained with the use of Function Analysis, the FAST diagram and the Mudge Technique in a chart and a graphic with the inclusion of cost parameters. The name of the method is an initials abbreviation of the words compare, parameters and resources. All pieces of information collected with the use of the cited tools and methods are gathered together and synthesized into a graphic known as the "Compare Graphic" [Ruiz et al. 2011]. It consist of two data series obtained from the Mudge Technique and the chart that includes the costs of the object's functions. The first data series is called "relative needs" and second one is called "resource consumption." The graphic shows which functions can be considered as those with higher potential for achieving target cost reductions without trading-off the basic functions of an object and the value perceived by the object receiver.

3. Simulation of the proposed approach

The simulation was oriented through the proposed sequence of implementation stages. However, some steps of this process, such as re-orienting company's culture, were omitted in order to focus on technical aspects of the proposed approach, which is the main objective of the paper. The simulation is going to be performed on the example of human resources department that needs to cut its annual costs down to 2.5 million PLN in order to achieve the company's desired operational margin rate.

In the first step, a functional analysis was carried out in order to identify human resources department's main functions and to classify them. In the beginning five main functional areas were selected. Each of them contains a finite number of functions that are provided through multiple services to other departments which create company's value chain. Each specified function was characterized by two words, a verb and a substantive. However, in some cases decryptions had to be supplemented with additional substantives. In the last step of functional analysis, all specified functions were classified as basic function (BF), secondary function (SF) and secondary necessary function (SNF), according to the description provided above. The example results obtained with functional analysis of human resource department considered in this simulation are presented in Table 1.

Table 1. Function Analysis of Human Resources Department (an example considered under simulation)

Major functional areas	Functions (verb + substantive)		Functions classification BF / SNF / SF
Planning	A	Collect data	BF
	B	Analyze data	BF
	C	Forecast HR supplies	SF
	D	Predict future HR needs	BF
Job analysis	E	Describe jobs	SF
	F	Specify human requirements	BF
	G	Provide information	SF
	H	Support personnel programs	SF
Staffing	I	Recruit personnel	BF
	J	Select HR	SF
	K	Fill job vacancies	BF
	L	Advertise recruitment	SF
Employee development	M	Provide trainings	BF
	N	Develop training programs	SF
	O	Formulate development programs	BF
	P	Assess individual employee's potential	SF
Employee maintenance	R	Provide compensation strategies	BF
	S	Develop motivational plans	BF
	T	Administer employee benefits	SF
	U	Maintain labor relations	SF
	W	Keep employee's records	SNF

Source: own elaboration based on the analyzed example.

The next step involved creating the Mudge Diagram on the basis of functional analysis. All functions were compared with each other in terms of the importance of human resources department administrative services for their receivers. The relative importance of each function was shown by means of a numeric evaluation, where: 1 means a slight dominance of one function of the pair, 2 means significant dominance and 3 represents absolute dominance of one function of the pair. It needs to be remembered that when comparing functions in the Mudge Diagram several rules must be obeyed. In each selected functional area no secondary function or secondary necessary function can dominate the basic function. For example, when comparing A vs. C the importance of A must be superior to C as the former is the basic function performed in the functional area. Nonetheless, while comparing two functions from different functional areas, it is acceptable that a secondary function or secondary necessary function can dominate the basic function in terms of their importance.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U	W	Σi i=Ai→Wi	Total points of each function (Σi; i=Ai→Wi)	Relative needs (%)
A	-	A1	A2	A3	E1	F1	A2	A2	A2	A2	A3	A1	A3	A2	A3	A1	A2	A1	A3	A1	A1	=ΣA	35	10%
B		-	B2	B2	B1	F2	B1	B1	B1	B1	B2	L1	M2	B1	B2	B1	B1	S1	B2	B1	W1	=ΣB	19	6%
C			-	C1	C2	F1	C1	C1	I1	C1	K1	L2	M2	C1	O1	P1	R1	S2	C1	U1	C1	=ΣC	9	3%
D				-	E1	D1	G1	H1	I2	J1	K2	D2	D1	N1	O2	P1	R3	S1	D1	D2	D2	=ΣD	9	3%
E					-	E2	E2	E2	E1	E1	E2	L1	E2	N2	O1	E1	E2	E2	E2	E2	E2	=ΣE	25	7%
F						-	G2	H2	F1	J2	K1	L2	F1	F1	F1	F1	F2	S2	F3	F1	W1	=ΣF	15	4%
G							-	H1	G1	G2	G2	G2	M2	G1	G1	P2	R2	S2	G1	U2	W3	=ΣG	13	4%
H								-	H1	J2	K3	L3	M3	N1	O1	H2	H2	H2	H2	U1	H2	=ΣH	15	4%
I									-	I1	I2	I3	M1	N1	I2	I2	I2	S1	I2	I1	I1	=ΣI	19	6%
J										-	J2	L1	J1	J1	O2	P1	R2	S3	J3	U2	W1	=ΣJ	12	3%
K											-	K2	M3	N3	O2	K2	K1	K1	K1	K1	W1	=ΣK	15	4%
L												-	L1	L3	L3	L2	R1	S2	L2	U1	L2	=ΣL	23	7%
M													-	M2	M1	M3	R1	S2	M2	U1	W2	=ΣM	21	6%
N														-	N2	P2	R3	S1	N2	N2	N2	=ΣN	16	5%
O															-	P2	O1	O1	O1	U1	W3	=ΣO	12	3%
P																-	R1	S2	P2	P1	P1	=ΣP	13	4%
R																	-	S2	R2	U1	R3	=ΣR	19	6%
S																		-	S3	U1	W2	=ΣS	24	7%
T																			-	U1	W2	=ΣT	0	0%
U																				-	U2	=ΣU	14	4%
W																					-	=ΣW	16	5%
Total points of the cross function's analysis Σ (Σi=A→W):																							344	100%

Figure 1. Mudge Diagram for Human Resources Department functions (an example considered under simulation)

Source: own elaboration based on the analyzed example.

Such a situation may occur when the whole functional area is of much importance to a company. In such a case, even a secondary function from this functional area may dominate the basic functions from less important functional areas in terms of their importance. Some of the Mudge Diagram application models allow “zero” score in numeric evaluation process [Ibusuki, Kaminski 2007], where none of the two paired functions is of higher importance. However, this may lead to overuse of “zero” in the process of comparing the importance of functions due to the consensus problem. The most recent research shows that in the situation of not having reached an unanimous decision, small groups of people often choose to support one that is in the best interest of the whole (consensus) [Cline, Welch 2009]. In order to avoid multiple consensus decisions, it is recommended to exclude equality of importance when comparing two functions.

Figure 1 shows an example of Mudge Technique results presented with the use of the Mudge Diagram, where it is possible to find each function’s relative need. For example, “K” function’s (highlighted) relative importance is obtained through the division of the sum of all “K” weights (highlighted column and line: 1+2+1+3+2+2+1+1+1+1=15) by the total sum of all functions weights (344). As a result, one receives information that performing this function should consume no more than 4% of the resources (in terms of acquisition costs) available for Human Resources Department.

In the next step total annual human resources department cost needs to be multiplied by the percentage of the resources consumed by each function obtained with the Mudge Diagram technique. At this stage, one rule must be respected in order to achieve cost reduction when multiplying that is if an initial resource consumption of a given function is lower than the one obtained with the Mudge Diagram technique, the former should be used in multiplication. For example, given “A” function initial resource consumption is lower than the obtained one, there is no need to modify the total annual cost of this function which remains at the previous level.

Results obtained with the Mudge Diargam technique, if properly conducted, show functions that a company needs to focus on in order to adjust the overhead costs of administrative process while preserving the value and quality of administrative functions performed for other units and subunits. The cost savings will depend strictly on how a company will manage in suiting the resource consumption of each function to “relative needs” for it. There are three major actions that arise from this analysis and which a company needs to implement if lower overhead costs of administrative functions should be reached. At first, a company should totally eliminate functions of no value for their receivers, such as units and subunits that create company’s value chain. In the analyzed example, such a function is “T”. The results obtained with the Mudge Diagram technique show no relative need for administering employee benefits. It has been dominated in terms of importance by every other function and has no relation with an administrative system as a whole. If it had any, it would dominate at least one function. Secondly, a company should adjust (lower) the resources usage by functions that show higher initial consumption than the one resulting from the Mudge

Table 2. Modified target annual Human Resources Department cost obtained with the use of the Mudge Diagram technique resource consumption results (an example considered under simulation)

Major functional areas	Functions (verb + substantive)		Relative needs (%)	Total initial cost (in thou. PLN)	Initial resource consumption	Total modified cost (in thou. PLN)	Modified resource consumption
Planning	A	Collect data	10.2%	243.31	7.3%	243.31	9.3%
	B	Analyze data	5.5%	341.98	10.3%	182.91	7.0%
	C	Forecast HR supplies	2.6%	76.63	2.3%	76.63	2.9%
	D	Predict future HR needs	2.6%	91.88	2.8%	86.64	3.3%
Job analysis	E	Describe jobs	7.3%	187.09	5.6%	187.09	7.1%
	F	Specify human requirements	4.4%	211.54	6.4%	144.41	5.5%
	G	Provide information	3.8%	153.99	4.6%	125.15	4.8%
	H	Support personnel programs	4.4%	178.03	5.4%	144.41	5.5%
Staffing	I	Recruit personnel	5.5%	289.17	8.7%	182.91	7.0%
	J	Select HR	3.5%	178.67	5.4%	115.52	4.4%
	K	Fill job vacancies	4.4%	64.90	2.0%	64.90	2.5%
	L	Advertise recruitment	6.7%	311.21	9.4%	221.42	8.4%
Employee development	M	Provide trainings	6.1%	189.39	5.7%	189.39	7.2%
	N	Develop training programs	4.7%	34.81	1.1%	34.81	1.3%
	O	Formulate development programs	3.5%	78.43	2.4%	78.43	3.0%
	P	Assess individual employee's potential	3.8%	70.23	2.1%	70.23	2.7%
Employee maintenance	R	Provide compensation strategies	5.5%	190.08	5.7%	182.91	7.0%
	S	Develop motivational plans	7.0%	111.67	3.4%	111.67	4.2%
	T	Administer employee benefits	0.0%	65.77	2.0%	-	0.0%
	U	Maintain labor relations	4.1%	31.85	1.0%	31.85	1.2%
	W	Keep employee's records	4.7%	211.08	6.4%	154.03	5.9%
		Totals:	**100%**	**3,311.71**	**100%**	**2,628.64**	**100%**

Source: own elaboration based on the analyzed example.

Diagram technique application. For example, performing "B" function consumed 10.3% of the resources (in terms of acquisition costs) dedicated to human resources department while the Mudge Diagram technique shows that relative needs ratio (5.5%) for this function is much lower than the percentage of the resources consumed by it. The costs incurred in order to perform such functions are disproportionately high compared to the value that they create in relation to the whole setup of human resources department functions. A unit should focus on finding a way to perform such functions with lower resource consumption ratio that will match the relative needs ratio. Thirdly, a company should not take any action towards functions that show lower initial resource consumption (in terms of acquisition costs) than the one resulting from the Mudge Diagram technique. An example of such a function is "A" function, which was performed at 7.3% of budgeted department costs while the relative need ratio of this function is much higher and reaches 10.2%.

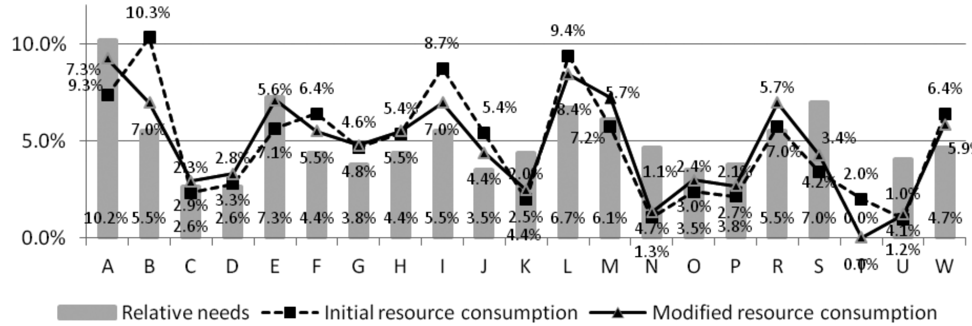

Figure 2. "Compare" graphic summarizing results of VE analysis (an example considered under simulation)

Figure 2 shows the "Compare" graphic, which is a visual tool used to help a company to identify cost intervention opportunities by considering the relative consequences of the provided functions value effectiveness for units and subunits. It summarizes the whole outcome of the analysis and presents it synthetically with one graph.

4. Conclusions

The presented systematic VE simulation exercise showed that it is possible to make use of the information about the value perceived by end-users, that is, units and subunits, comprising six basic business functions of any company and, at the same time, to reduce costs considering both perspectives of value. This step by step simulation exercise can contribute to answering the question of how to assess cost issues in the company's administrative process without trading-off the delivery of the administrative functions value to its receivers. The "Compare" graphic provided a clear path for establishing cost reduction interventions priorities focusing on functions with greater contrast between the resource consumption (cost) and relative needs. The exercise presented above has its limitations as the chosen context was deliberately restricted to a human resources department in order to better understand and evaluate the VE analysis use in the administrative process supporting existence of units and subunits incorporated into a comapany's value chain. As further research suggests, it is recommended that the VE simulation be used in broader overhead costs reduction context.

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