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The DMAIC cycle in managing the development of work potential in service enterprise

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ABSTRACT

The objective of the analysis conducted and described in this paper is to present the practical application of the DMAIC cycle in managing the development of work potential in service enterprise. The first part of the article contains the theoretical framework of work potential, its development, and the DMAIC methodology. Afterwards, based on the process approach to work potential development, practical application of the DMAIC cycle has been presented with using an anonymous survey to measure and analyze the problem, the 5Why method for finding the causes, and the Impact and Effort Matrix in improvement phase to choose the solutions worth implementing.

Keywords: DMAIC cycle, management, work potential development

1. INTRODUCTION

Work potential is the term that in the literature of management and human resources does not have one unequivocal and straightforward definition. The basic division distinguishes the quantitative and qualitative aspect. The first one concerns work time, the second one consists of set of elements such as knowledge, experience, skills, abilities, and motivation. Both dimensions creates work potential that can be understood as the time in which these listed factors are disposed by the enterprise.

Another definition of work potential highlights the primary factors and their derivatives. Personal characteristics of employee (such as the aforementioned knowledge and individually psychological characteristic) translates into skills revealed during professional duties. Employee's dispositions which are a dynamic resource remain in the feedback loop with the skills and may change in two presented aspects [1].

Work potential should be managed wisely. Management is defined as the organizational process which includes strategic planning, appointing objectives, disposal of material, financial, informational and human resources to achieve these objectives with measurement of results [2]. An effort of all members of the organization are coordinated to achieve the goals.

Five basic functions of management are designated as following [3-5]:

- planning - the most fundamental function concerns "what, how, and when" is to be done in advance to perform effectively; the aim of planning is to determine present and future goals and course of action for their achievement;
- organizing - the second function is about identification of activities for individuals and groups and enabling them to perform these action by providing the necessary resources. The basis for organizing is integration of all types of resources with combining positions, tasks, responsibilities and relationships;
- leading - this function includes exerting influence on the members of organization to inspire them to making to joint effort to achieve the set goals;
- controlling - the purpose of this function is to ensure that the results of taken actions are consistent with the set objectives. Controlling also includes taking corrective actions in case of deviations that are subsequently feedbacks for managers who can constantly monitor and modify other functions.

Enterprise management is understood as a complex issue. It applies to particular areas of activity, aspects, resources, and processes at various levels. One of them is development management that can be defined as a decision-making system which focuses on shaping progress. Progress means striving for the implementation of new solutions (organizational, technical or economic) in particular areas of enterprise's activity [6].

Each enterprise is characterized by individually determined development opportunities that depend on a wide set of factors. The main division distinguishes the development factors of the internal and external environment. Internal environment factor, meaning enterprise's potential, is composed of financial condition, organizational conditions such as attitude, knowledge and skills of managers, and technical conditions- technical background. External environment factors are opportunities and threats related to undertaking development activities identified outside organization [7].

Importance of managers in management development is argued by setting the direction of development, defining strategic objectives, and selection of appropriate methods, techniques, and tools of management.

One of the most approved management concept is process approach. The basis of this concept is to focus on the key word in this phrase: "process" that basic studies define as a group of interacting or interrelated value-added activities which transform inputs into outputs and using the adequate resources such as people, materials, machines, information, energy, and others [8, 9].

Concentration on processes means that in case of this approach management recommends systematic identification, measurement, evaluation, and continuous improvement of processes

that are managed with their correlation using suitable process-based methods and tools to achieve the desired objectives [10].

The main objective of process approach to management is to constantly improve process efficiency by reducing costs, shorten time and strengthen out the quality of processes and their results because of providing many-sided view of the whole resources that are involved in processes. Process management is characterized by holistic approach to the enterprise's functioning and holistic way of management that cause activities which are managed in order to create value required by inside and outside customers [11-13].

The six sigma, an innovative method of quality management, was introduced in Motorola in the eighties. Its aim was to improve the quality of the production processes by reducing defects which cause the reduction of costs and time of production and improve the quality of products. The word "sigma", taken from statistics, means every deviation from the standard. The highest level-sixth one, which means the achievement of six sigma, is the information that analyzed process produce no more than 3.4 defects per million opportunities [14].

Nowadays, six sigma has been considered as organized and systematic way of improving processes and developing the products. Attempts to apply this method in the aspect of services in literature and business practice have become more and more popular. Currently, six sigma should be perceived as business strategy based on improving companies' profitability by driving out waste, reducing costs and increasing the efficiency and effectiveness to achieve the goal of meeting customers' expectations [15, 16].

Treating six sigma as a strategy, which ensures development and builds higher enterprise's market position, requires compliance with several main rules. First of all, customer is the most important. The concentration on the customer means that customer's needs, expectations and requirements must be met. Secondly, only the truth counts.

All the analysis are based on real, collected, and measured data. What is more, the basis of enterprise's functioning is continuous improvement in all aspects. Perfection is impossible to achieve but enterprise incessantly has to strive for it. Continuous improvement is also required by dynamically changing environment and growing customer requirements. Last but not least, management should be proactive and every level in enterprise should communicate and cooperate [17, 18].

The six sigma methodology is mainly based on the DMAIC cycle. DMAIC, being an acronym from define-measure-analyze-improve-control, is modified and developed model of the PDCA cycle. Firstly used as problem-solving approach (to reduce the number of variations of the process by eliminating the problems occurring in it), nowadays the DMAIC cycle may be useful for improving various processes in many areas in the enterprises [19, 20].

The DMAIC cycle consists of five connected phases [21-25]:

- Define - this stage includes defining the goal (which has high priority and will have high impact on the enterprise), identification of needed resources and involved departments, obtaining support from management and identifying customers (individuals and groups, external or internal) of the process with their requirements; useful tools are SIPOC Diagram (showing the transformation of inputs from suppliers to outputs for customers) and CTQ's with VoC (identifying the critical-to-quality factors based on Voice of Customer- data collected from customers);
- Measure - measurement phase mainly focuses on collection of reliable data that are then used for mapping out the current process and updating the goals; useful tools are graphical ones: the Value Steam Mapping, process maps, block diagrams;

- Analyze - analyze stage is closely intertwined with the previous phase. Collected data should be statistically and qualitatively examined to reliably and accurately describe the problem. It is highly recommended to use visual ways of analysis and presentation its results that should be understandable and readable by all involved employees because they are the basis for further improvement step. The purpose of the analysis is identification and verification of causes of the problem that may be eliminated by improvement actions; suitable tools are statistical diagrams and charts, cause-and-effect diagram, Pareto chart, FMEA analysis, 5Why analysis, 5W2H analysis, and FMEA analysis;
- Improve - the penultimate phase of the cycle concerns elaboration a solution to the problem. Measured and analyzed data should be used for brainstorming potential solutions which should be prioritize based on identified customers' requirements and selected by chosen criteria (such as: cost, time, benefits, resources, possibilities, practicability); the chosen solution(s) should be implemented to business practice; Brainstorm and various matrixes are irreplaceable tools for improvement phase;
- Control - if the solution can resolve the problem, it must be standardized. The achieved improvement need to be sustained. The process should be properly monitored and managed.

2. EXPERIMENTAL AND RESULTS

The first part of application of the DMAIC cycle is to identify the process in the chosen enterprise. The subject of presented research is one of the organizational unit of service enterprise from the logistic industry.

Process-oriented presentation of development management of work potential requires specification of three main stages of the process: input, transformation, and output. In relation to the development management the entry vector consists of current work potential (knowledge, experience, skills, abilities, and motivation of employees and time of disposition of these factors), organizational and technical conditions (organization of the current process and enterprise's functioning, organizational culture and climate, attitude of the management board, possibilities, financial and economic situation, and equipment), needs and expectations (for employees as well as for management board and customers), standards, rules, and procedures (corporate-internal and required by law), and methods and techniques of development management.

Transformation means realization of the work potential development process that creates output which includes development of work potential, meeting the need and expectations (specified groups), and information (being the basis for further actions). All of these three stages are managed with having feedbacks (Fig. 1).

Currently, the managing of the development of work potential in the subject of research includes three stages (Fig. 2):

- planning,
- process,
- controlling.

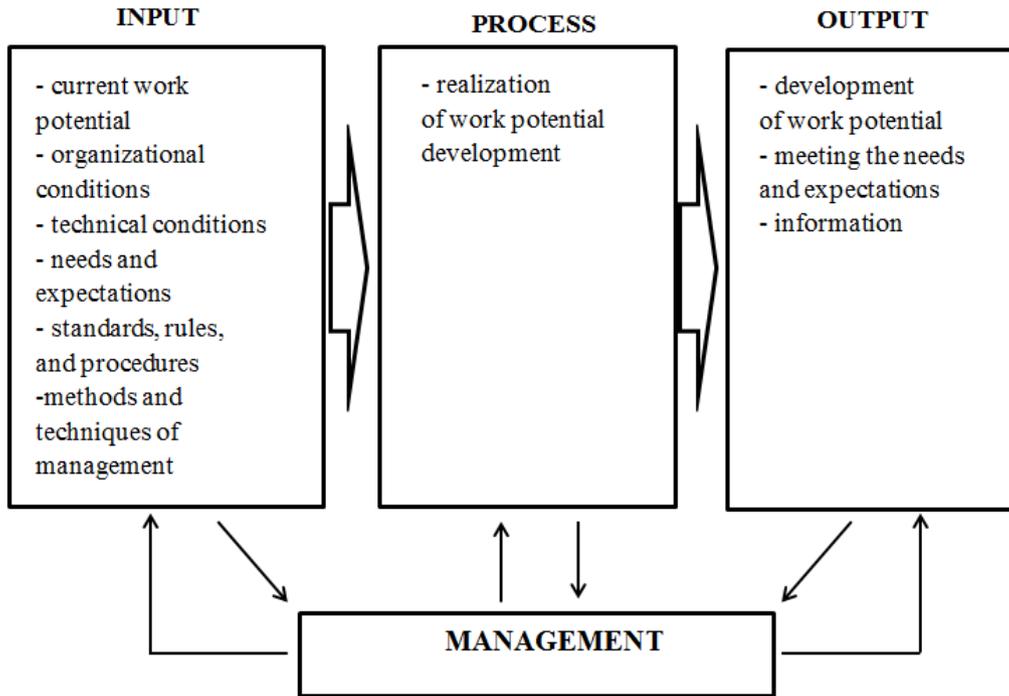


Figure 1. Work potential development management as a process

Source: The article author's own research

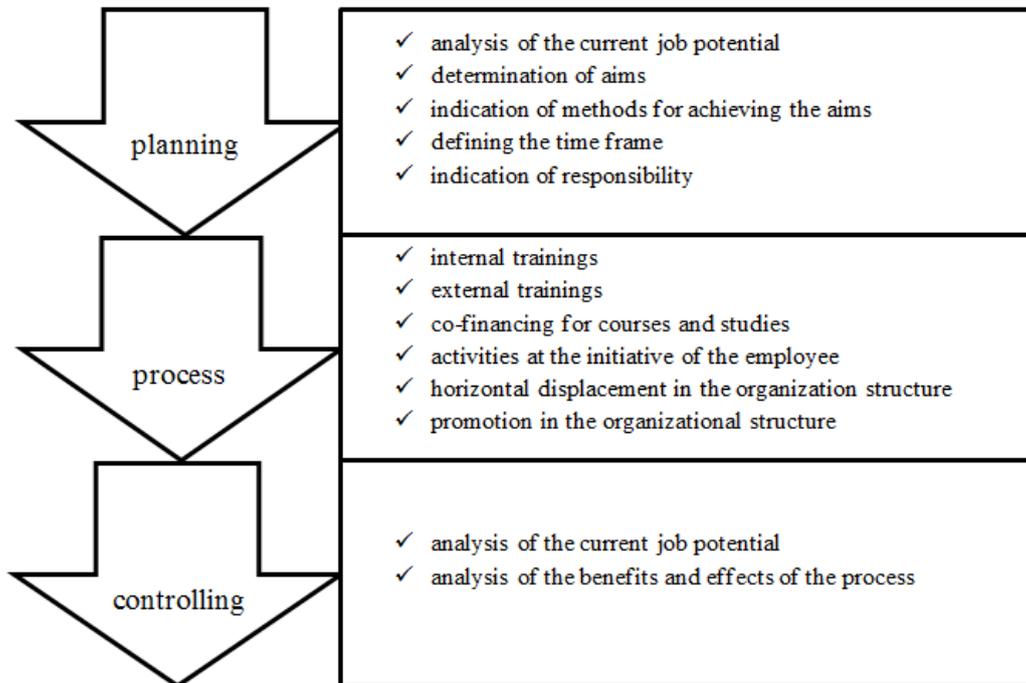


Figure 2. Current process

Source: The article author's own research

To measure the situation according to the second step of the DMAIC cycle, an anonymous survey was conducted. In the survey participated 40% of the employees in this organizational unit. The employees were asked by short questionnaire about the six presented activities from the second stage of current job potential development process. The questions concerned knowledge, use and benefits of the enterprise's development opportunities.

The first question is: Do you have some knowledge about particular, available in this enterprise activities that may increase job potential? (Fig. 3).

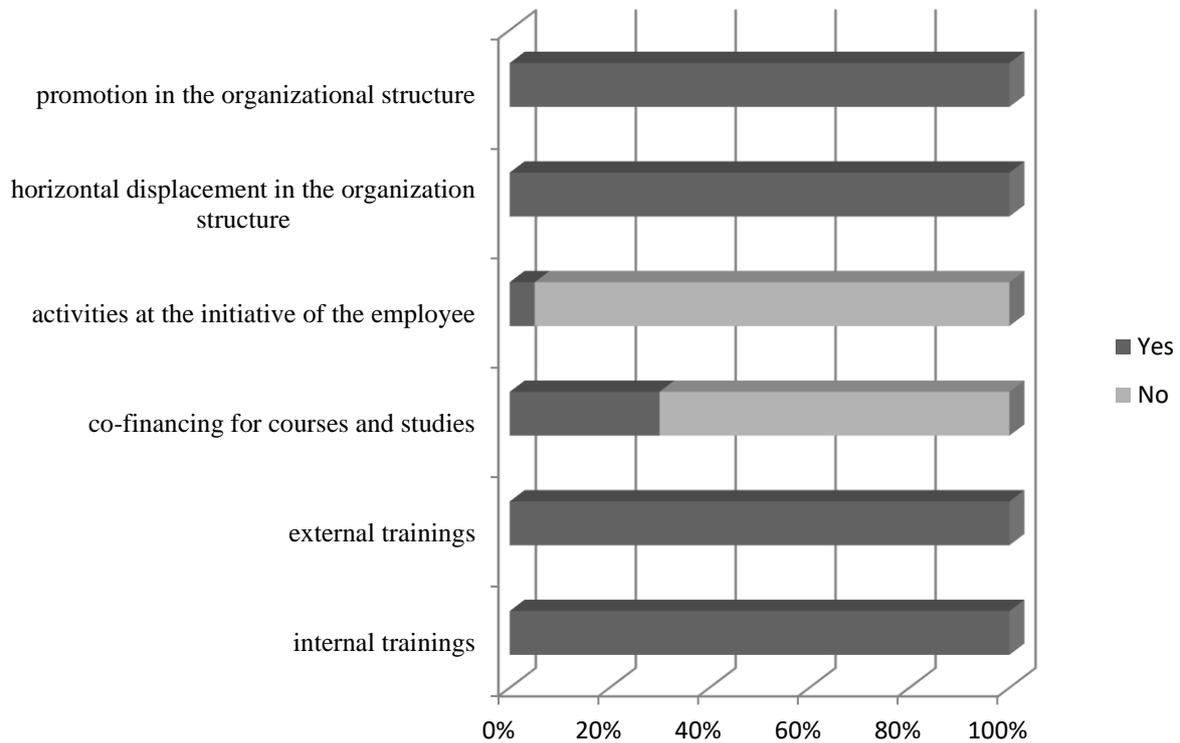


Figure 3. Employees' knowledge about activities developing job potential

Source: The article author's own research

According to the presented data it should be seen that the state of knowledge of employees about the activities developing job potential in the enterprise is high. Four out of six of them are known for all of the respondents. However, it should be noticed that only 30% of employees know that the enterprise may co-finance useful courses or studies and as much as 95% of them do not know that they can seek development opportunities for their own with enterprise's support.

The second question from the survey is: Which forms of job potential development have you ever used? (Fig. 4).

The data shows that despite extensive knowledge, many employees do not use available forms of development. Worth noticing is that all of the respondents take internal trainings. It means that these kind of trainings are mandatory and regularly carry out in this enterprise. Moreover, 60% of them have ever displaced horizontally in the organizational structure, 40%

of the respondents developed job potential on their own initiative, every fourth have ever participated in external training, and 10% were promoted or got funding for a course or study.

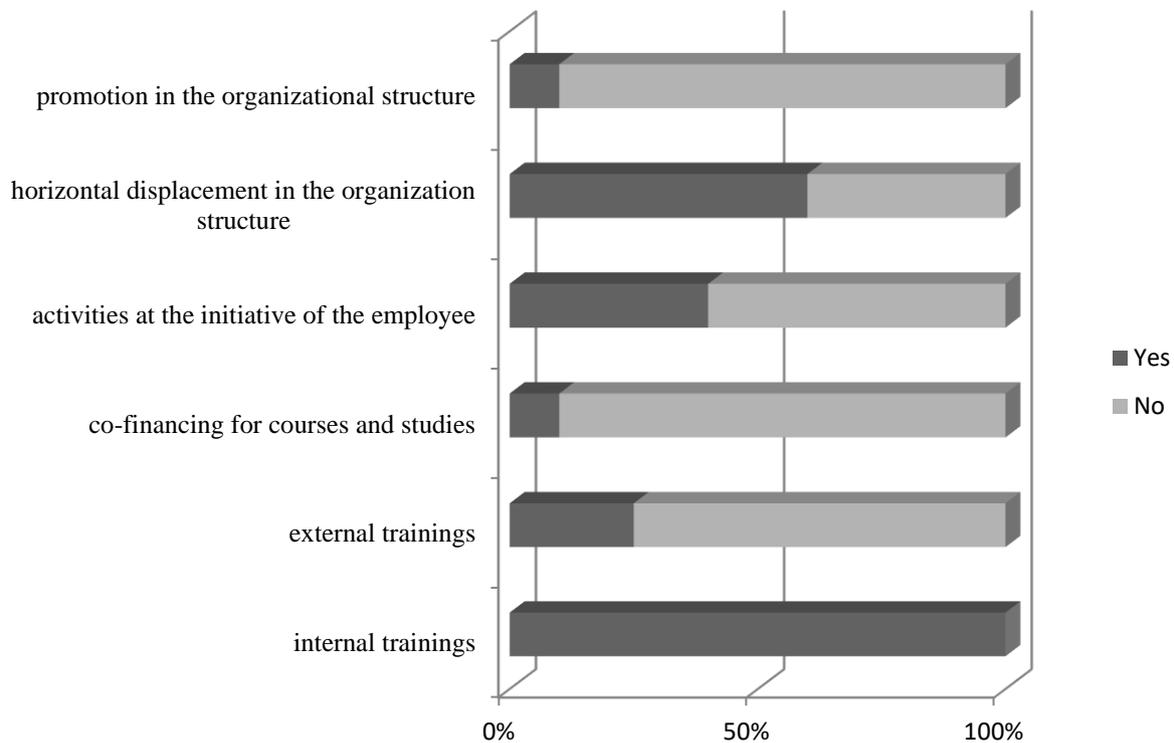


Figure 4. Employees' usage of particular developing job potential's forms

Source: The article author's own research

A group of respondents that in the previous question indicated the use of any form of development answered one more question, whether this activity turned out to be useful at work? (Fig. 5).

The presented data shows that respondents consider horizontal displacement in the organizational structure, activities at their own initiative, and co-financing for courses and studies as the most useful developmental activities. Furthermore, half of them values external trainings but only 30% of them- compulsory internal trainings.

Obtained at the phase of measurement and analyzed the results of the survey pointed out the key elements of job potential development process that need improvement:

- lack of information (about the possibility of undertaking development activities at the initiative of the employee and possibility of co-financing courses and studies),
- low percentage of employees participating in these forms,
- little usefulness of trainings, especially internal.

Improvement phase has been conducted with the 5Why method which is based on searching for the causes of the problem through the question: why in the amount necessary to find it (Table 1).

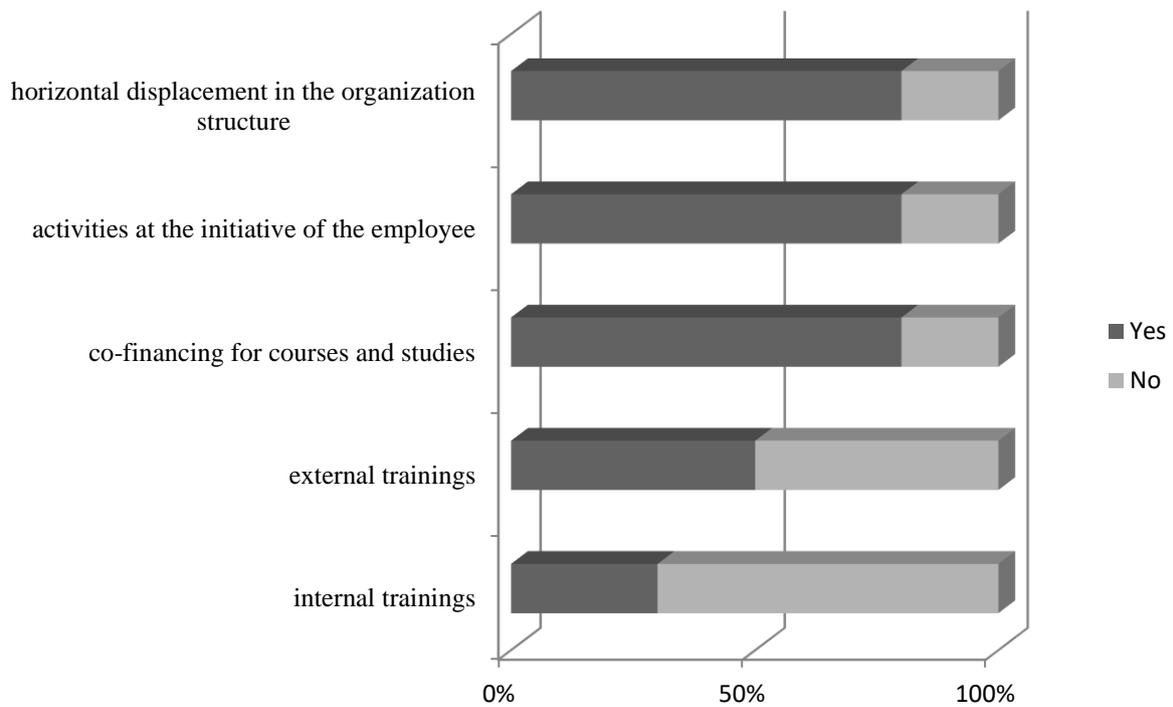


Figure 5. Usefulness of particular forms of development in respondents' opinion
 Source: The article author's own research

Table 1. Improvement phase- the 5Why method

Problem	1Why	2Why	3Why	4Why
lack of information	no information campaigns	underestimating the importance of development activities	enterprise's strategy	
low percentage of participating employees	lack of information	see above		
	lack of motivation	lack of knowledge about benefits	lack of development meetings	decisions of unit manager
	low benefits for employee	no remuneration program for development	the bonus system does not include it	
	little usefulness activities in work	see under		
little usefulness of trainings	imposing training topics by management	lack of consultation with employees		

Source: The article author's own research

The data presented in table 1 shows that the most important causes of diagnosed problems are:

- enterprise's strategy that does not include the importance of job potential development (C1),
- lack of development meetings or information campaigns about the possibilities of development (C2),
- current bonus system that does not include any program of employees' remuneration for effort and willingness to undertake development activities (C3),
- selection of trainings without consultation on the needs of employees (C4).

Potential solutions to the indicated problems are:

- including job potential development as an element of the enterprise's strategy (S1),
- introduction of information activities on development opportunities (S2),
- expanding the bonus system for bonuses for developing employees (S3),
- selection of trainings based on employee consultations (S4).

Due to the formulation of several solutions, further improvement measures should be taken. For the purpose of this study the Impact and Effort Matrix as another tool of improvement has been chosen. It shows selected potential solutions of the identified problems' impact on the causes and at the same time effort and cost that must be incurred for implementation particular ideas (Table 2).

Table 2. The Impact and Effort results

Weight (importance factor)	Cost	Difficulty	Impact on				Total Score (Impact)	Total Score (Effort)
			C1	C2	C3	C4		
	5	5	5	5	5	5		
Potential Solutions (No.)								
S1	9	9	10	8	7	5	150	90
S2	3	4	3	10	1	1	75	35
S3	7	6	5	1	10	2	90	65
S4	4	4	4	1	1	10	80	40

Source: The article author's own research

Weights of cost, difficulty and particular causes' impacts have evenly been rated in the middle of scale. The results of research is presented in Fig. 6.

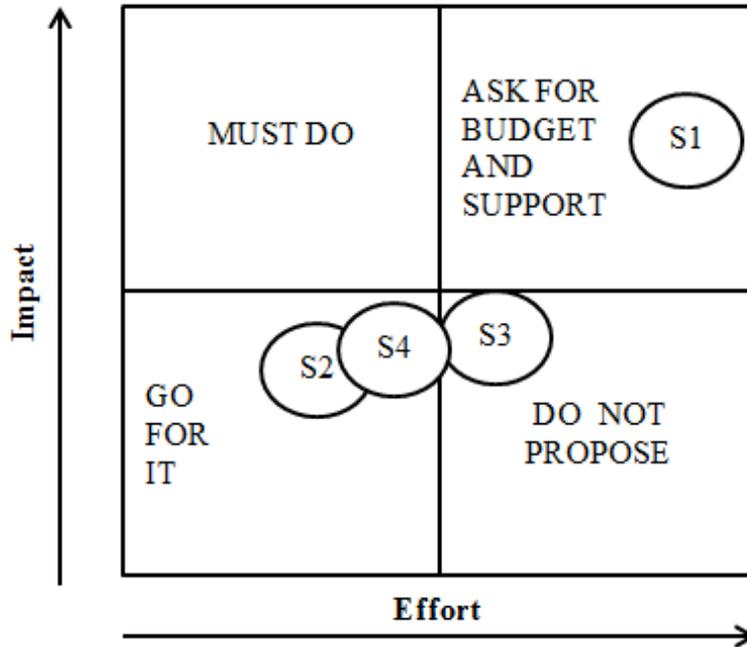


Figure 6. The Impact and Effort Matrix
Source: The article author’s own research

The presented data shows that two of the solutions should be implemented. These are: introduction of information activities on development opportunities and selection of trainings based on employee consultations. One of them (expanding the bonus system) is too costly and does not have an impact that could balance it. Changing enterprise’s strategy is worth considering because of the highest impact of diagnosed problems.

The implemented solutions should be controlled according to the last phase. The tools of control may also be employee consultations which reveal the effectiveness of the taken actions. Moreover, worth using are also performance indicators.

3. CONCLUSIONS

The results presented in the paper shows that the DMAIC cycle finds practical application in management of work potential development in service enterprise when work potential development is treated as a process being improved. Following the cycle methodology may present the current situation in a process approach, diagnose problems, find causes, propose improvement solutions, assess the possibility and usefulness of their implementation, and choose methods of control. Application of the DMAIC cycle helps to proceed methodically. Likewise, this methodology has an extensive set of tools that can be adapted to the specifics of the enterprise and the requirements of the subject of research. Using the DMAIC also requires remembering that this is a cycle that should be constantly used based on the philosophy that perfection cannot be achieved but enterprises should strive for it. The article may be the basis for further research in the field of the DMAIC cycle application or new methods of management of work potential development.

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