



Making Decisions on the Parameters of Value Flow in Support Processes of Manufacturing Companies

Sylvia Łęgowik-Świącik, Ph.D.,

Czestochowa University of Technology, Faculty of Management, Poland.

sylwialegowik@op.pl

Małgorzata Kuraś, Ph.D.

Czestochowa University of Technology, Faculty of Management, Poland.

m.kuras@onet.pl

Abstract: The aim of the paper is to present the analysis and the assessment of the decisions taken in the area of parameterization of value flow in the field of the costs of support activities of the chemical company. In the first part of the paper the process of decision-making concerning the basic parameters of value flow is identified. Subsequently, the essence of support processes in the production activity of the company is presented and the significance of management of the operation of machinery and equipment is discussed. The final part of the paper constitutes the presentation of the results of the empirical studies, in which there is conducted the analysis and the assessment of cost parameters of the value of support processes of production of the surveyed company. The applied research method are the literature studies, the comparative analysis and the trend analysis of the cost information on support processes of production of the surveyed company.

Keywords: decision-making in a company, parameters of value flow

1 Introduction

Weaknesses of modern management revealed during the economic crisis enforce “management breakthroughs” consisting in “the selection of the set of operating methods with the instruments of crisis management”[21]. Therefore, taking decisions concerning future directions of enterprise development requires from the manager the ability to assess the current situation using useful instruments allowing for a prompt reaction[7,22]. In the view of the above, forward planning, which amounts to innovativeness, becomes an essential competence of the manager[10].

The promptness of the reaction to the environmental changes is determined by the pace of decisions taken by managers. Therefore, managers must “create new properties, behavior and attitudes which will constitute an adequate response to the globally transforming reality”[15], which means that the effectiveness of the decisions affects the capacity of enterprises to adapt.

The key role against the background of the production activity of enterprises is played by support processes of production. The basic task of support processes of production is maintaining high performance of the machinery stock during cyclic operation of technical facilities and ensuring their failure-free operation. The maintenance of the machinery stock is the area whose the maintenance costs have become the subject of interest of economic and financial services of most of rapidly developing enterprises, which search for possible cost reduction. Looking for the way of running rational maintenance management at the lowest costs and simultaneous possibly highest efficiency has become an important decision-making area for managers of modern enterprises.

The paper aims at the presentation of the analysis and the assessment of the parameterization of value flow from the perspective of decision-making in the area of costs of the support activity. The object of the study is the chemical company. The empirical studies were carried out in the area of maintenance of the process line. The literature studies were conducted in the theoretical part of the paper to achieve its objective. The theoretical considerations were supplemented with the descriptive analysis and the trend analysis of cost parameters of value in maintaining the process line of the surveyed company.

2 The identification of decision-making in the area of the basic parameters of value flow

A decision is “the conscious and deliberate choice which is made with a specific objective function, in the limiting conditions and criteria of one of the recognized options of problem solving”[17]. This means that a decision is taken as a result of the mental activity of a decision-maker who bears responsibility for the effects of a decision [12] while simultaneously confirming the non-random nature of a decision [19].

Decision-making is indicating the solution which fulfills all special conditions allowing for the compromise in which a decision can be taken [8]. The process of decision-making is “recognizing and defining the nature of the decision-making situation, identifying alternative options, the selection of the best solution and its practical use”[9]. In reference to the above definition, it is acknowledged that the decision-making process is the transformation of information into the managerial decision [25].

Decision-making is choosing one possible solution from among many alternative options. A decision must be preceded by recognizing opportunities and threats which may occur while adopting a particular solution. Therefore, while searching for the ways of solving a decision-making problem there is assessed the continuum of the decision-

making conditions on a scale, from the certainty corresponding to the full possibility of predicting decision-making options, through making decisions under risk to the decisions taken in the conditions of uncertainty [23].

The pace of decision-making is determined by the rapidity of collecting information and the time of its processing for the purpose of defining the decision-making problem and the assessment of its results [18]. Evaluating the individual options involves describing the conditions for decision-making, which is the information enabling proper understanding of the decision-making problem.

An important area of decision-making in a company are costs, which constitute the basic parameter of value flow, conditioning the efficiency of processes [16]. Costs may have considerable impact on development of the economic and financial situation of enterprises. C. Drury concludes that costs can be divided into three categories: costs for decision-making, costs for controlling purposes and costs for inventory valuation [4]. The concept of cost is connected with a specified object, activity or its effect, e.g. a manufactured product or a provided service[20]. In the subject literature it is underlined that costs concern sacrificing one value for the benefit of achieving a different one [3]. Taking into consideration the above categories, it is possible to conclude that the objective of the measurement of costs is decision-making, valuation of products or provided services and planning and monitoring the conducted activity.

3 The essence of support processes in the production activity of the company

The task of support processes of production in a company is bringing fixed assets, which lose their initial value in use due to operation, to their working condition, which is manifested both in the functioning of the company and the decisions of the management staff [24]. The concept of 'operation of technical facilities' is defined as "a set of deliberate organizational and technical and economic activities and mutual relations occurring between them from the moment of accepting the object for the intended use to the moment of its disposal" [13]. This means that under the influence of operation and after the expiry of the calculated period of time, fixed assets not only lose their economic value but also the initial value in use. According to R. Borowiecki, decision-making in the area of support processes of production must take into consideration "the appropriate view on management of machinery, which is given by the results of the analysis of the use of machinery and equipment in an extensive way, considering their working time and in an intensive one, concerning their technical parameters [2]. The above quotation proves that the test cycle in the area of operation of technical objects begins with establishing the extent of activity of machinery and equipment in the production activity of the company and finishes with the assessment of these processes.

The operation of machinery and equipment is strictly connected with their reliability which, in the subject literature, is defined as "the property characterizing the capability of equipment to perform correctly the assumed functions at a specific time and under

specified operating conditions (use or repair)[11]. Reliability of a technical object includes such properties as: durability, non-damagability, maintainability and storability. Durability of machinery or equipment is understood as the property of the object to maintain usability in specific conditions until the end of its operation. Non-damagability is the property of the object which characterizes its ability to maintain usability while performing a task. Maintainability amounts to the property of the object characterizing its adjustment to making repairs in the specified conditions of operation. Storability is the property of the object to maintain usability during storage"[14]. In respect to the cited definitions, it is necessary to pay attention to the fact that the concept of working condition refers to the development of the task in accordance with the assumed requirements.

4 The significance of management of the operation of machinery and equipment in support processes of production

It is assumed that the management strategy of the operation of machinery and equipment should be oriented towards rational use of technical objects and taking optimum decisions in the situation of their inappropriate functioning. The decisions bring about the activities among which it is possible to identify the activities aiming at removing or counteracting incapacities and, if there is such a need, exchanging and managing worn parts. Therefore, management of the operation includes all the activities connected with repairs, maintenance and diagnostics of machinery and equipment.

The operation of machinery and equipment should be conducted correctly. The correctness of this use may be characterized on the basis of the technical, economic and safety criteria [1]. The technical criterion refers to specifying the extent of fulfillment of technical functions of the analyzed machinery or equipment. In reference to the economic criterion of a technical object, there is carried out the assessment of its technical properties from the economic point of view. In turn, the safety criterion concerns the evaluation of the functioning of a device in accordance with the regulations of health and safety at work and the environmental protection.

In regard to the discussed criteria of the correctness of use of machinery and equipment, the problem of repairs has been the focus of attention. In the subject literature, maintenance is classified by the way of planning, organizing, carrying out and monitoring, and there are identified: scheduled general overhaul, post-inspection maintenance, routine repairs, standard repairs, team-distribution repairs, preventive maintenance, damage repair [5].

In the paper the attention has been drawn to the characteristics of only the selected repairs, i.e. scheduled general overhaul and maintenance and preventive repairs and damage repairs. The objective of scheduled overhaul is to provide effective operation of technical objects for a possibly long period of time by carrying out preventive repairs, thus avoiding sudden failure. Scheduled repairs constitute "the ordered set of methods

of controlling the operation of fixed assets by normalizing the maintenance service. It includes norms and maintenance indicators, planning procedures, samples of maintenance documentation, principles of liability for the operated object and general principles of operation”[26]. Maintenance and preventive repairs are carried out to control the correctness of the condition of the operated machinery and equipment. On the basis of the inspection of the used objects the assessment of the condition of machinery and equipment is made. In case of failure detection, unscheduled repair is ordered. The idea of the method consists in carrying out regular controls to enable early response to the occurrence of dangerous phenomena indicating errors in the operation of devices. The advantage of this method is the fact that diagnostic measurements performed in its framework are carried out during operation of the machine. A particular kind of repairs is an unscheduled repair, i.e. damage repair. Damage repair is connected with the occurrence of the failure and its elimination. Equipment failure is defined as “unpredicted damage to the machine causing a break and disturbances in the production process” [6].

Effective maintenance management brings about an increase in the overall performance of manufacturing systems. However, in practice it is rare that the production process runs smoothly. The main reason of stoppages of technical objects, lowering the efficiency of machinery and equipment, is their failure. Off-schedule downtime of technical objects bring about the loss of time. It happens that failures to objects only reduce their operation with simultaneous reducing the performance. The problem in the other case is detection of failure or inefficiency causing the reduced performance. To maximize the operation of machinery and equipment and to avoid unscheduled stoppages, it is very important to carry out all possible activities minimizing the risk of failure occurrence. To achieve this, it is necessary to aim at reducing the accelerated processes of subassembly wear, monitor currently the basic parameters of working conditions and maintain the high quality of repairs.

The significance of the correctly functioning system of maintenance has large impact on the level of operational costs in a manufacturing company. The most important benefits, brought about by efficient management of the operated technical objects, include: noticeable reduction of costs of manufacturing connected with lower costs of repairs due to failure, unplanned downtime of production lines, also caused by failure and elimination of delays in the delivery of finished goods to consumers. Moreover, failure-free operation of machinery stock allows to develop the assumed production plans and schedules, brings about a decrease in the demand for maintenance services and causes an increase in the performance of machinery and equipment. At this point, it is necessary to draw attention to lower costs of maintenance of a technical object, decreasing the level of inventory and a smaller number of accidents at work.

5 The analysis of the assessment of the cost parameters of value of support processes of the surveyed enterprise

The empirical part of the paper was developed on the basis of the research conducted in the chemical company in Poland. The empirical study was carried out on the basis of the cost analysis of the downtime of technical objects. The research area are the costs generated by general overhauls, damage repairs and maintenance repairs. The research period are the years of 2007-2012. The selection of maintenance costs, as the research object, was determined by the horizontal approach to the economic categories. Cost information influences the decisions optimizing support processes of production and, at the same time, the maintenance of the process line.

Appropriate management of support processes of production requires the possession of filtered, qualitatively suitable and useful cost information, which enables the development of the optimum decision-making model to eliminate the occurrence of failure and unplanned stoppages of the process line.

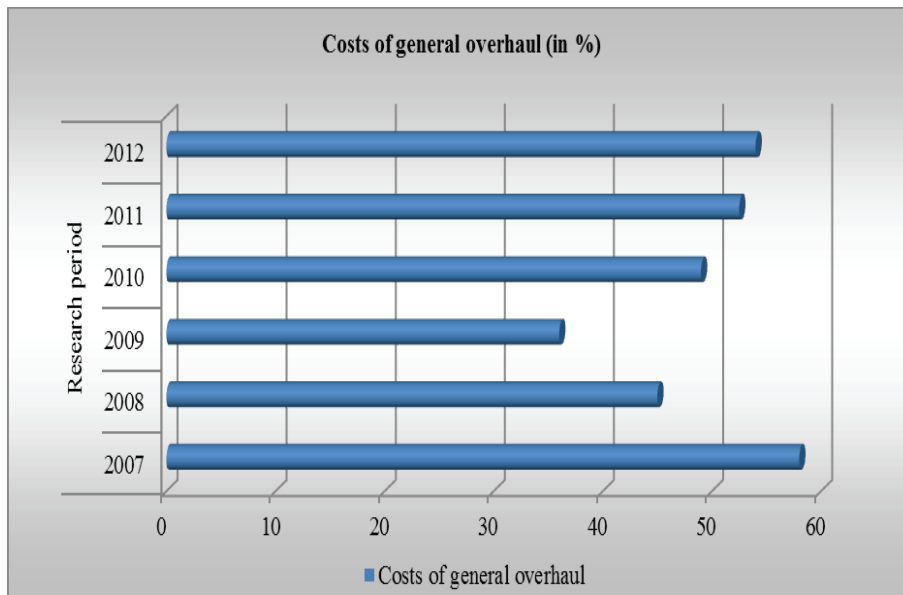


Figure 1

The share of costs incurred on general overhaul of the major machinery stock

Source: The author's own study.

The analysis of Figure 1, concerning the share of costs incurred on the scheduled general overhaul of the major machinery stock of the company in the surveyed period, shows that these costs constitute the biggest share of the maintenance budget. The results of the analysis showed a downward trend in the first three years under the analysis, and in the next two years – an upward trend was noticeable. In the first year of the research period, the share of costs incurred on work performed during general overhaul amounted to 58% of all the costs incurred on maintenance. In 2008 the share

of the discussed costs constituted 45%, and in 2009 it went down by further 9 % in comparison with the year of 2008. The reduction of funding for general overhaul was the consequence of the economic crisis beginning in Poland and all over the world. In connection with an uncertain situation in the country there were taken the decisions on minimizing expenditure on general overhaul. In 2010 the share of costs incurred on general overhaul went up to 49%. An upward trend remained the same in the next two years of the research period, amounting to 52.5% in 2011 and 54% in 2012.

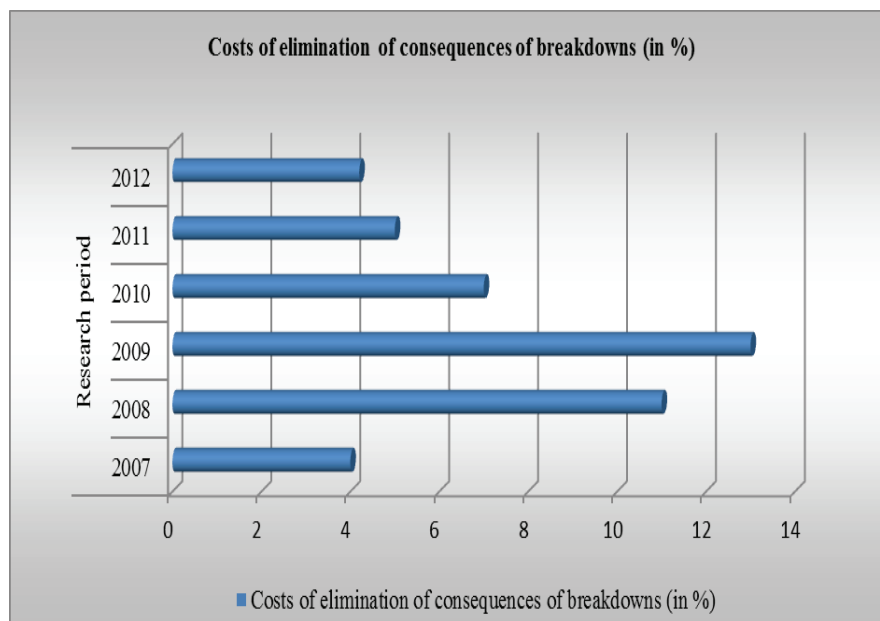


Figure 2

The costs incurred on the elimination of failure and its consequences

Source: The author's own study

Figure 2 shows the share of costs incurred on the elimination of failure and its consequences in the overall maintenance budget in every year of the research period. The analysis of the above figure proves that in 2007 the costs of failure repairs amounted to 4% of all works concerning maintenance. In the following year, high growth of these costs was recorded, achieving the result of 11% of all works carried out in the framework of maintenance. The year of 2009 brought about another increase in costs of failure repairs up to 13% and it was the highest result in the whole research period. In 2010 the costs of failure repairs decreased in comparison with the previous year and they amounted to 7% of the total maintenance costs in that year. In the years 2001-2012 there was a decrease in costs incurred on the elimination of failure and its consequences in the overall maintenance budget, amounting respectively to 5% and 4.2%.

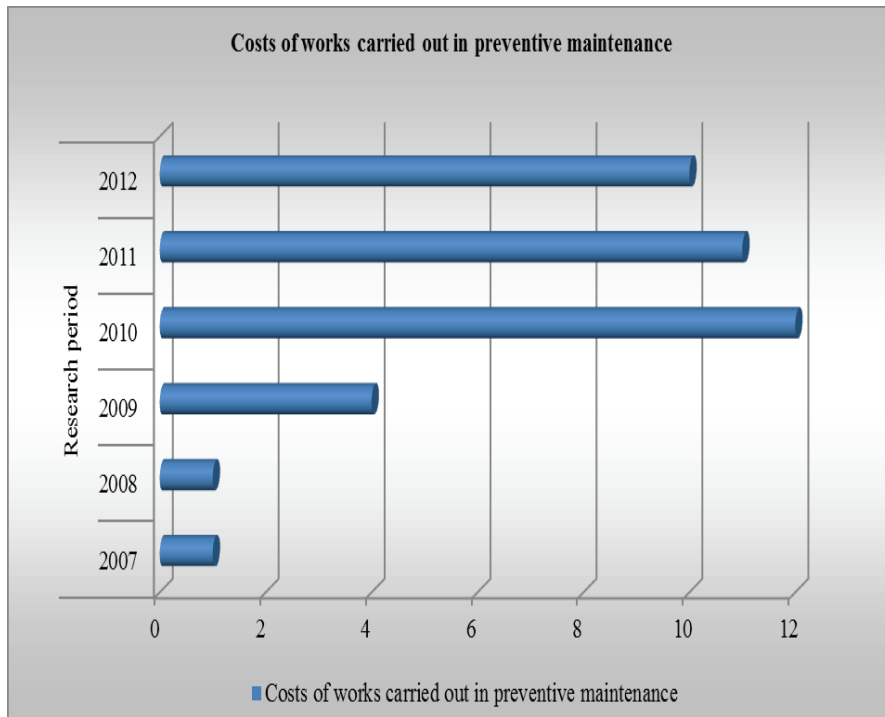


Figure 3
The share of works carried out in preventive maintenance
Source: The author's own study

In the first two years of the research period the share of works in the framework of preventive maintenance (Figure 3) amounted to less than 1% of all the works concerning maintenance, therefore, it was insignificant. In 2009 the share of the discussed works amounted to 4% of all the works. In 2010 the share of works in the framework of preventive maintenance achieved the level of 12%. A noticeable increase in the share of the discussed works presents the reaction of the managerial staff to the information flow concerning an increase in the occurrence of failure in 2008. To reduce the occurrence of failure in 2009 the amount of preventive maintenance works was increased while diminishing the cost of works carried out in the framework of preventive maintenance in the years 2011-2012, respectively to the level of 11% and 10%. The decisions of the management staff concerning an increase in costs designed for preventive maintenance in the critical period were reflected in the reduction of failure occurrence.

The conducted research shows that there is a correlation between the level of costs incurred on general overhaul and the level of costs incurred on the elimination of the effects of failure and preventive maintenance works. Lowering the costs incurred on general overhaul brings about an increase in the costs of elimination of the consequences of failure and an increase in costs of preventive maintenance works. Analogically, an increase in costs of general overhauls brings about a decrease in costs

of failure and preventive maintenance works. This means that current verification of maintenance costs allows for making appropriate managerial decisions in the field of the formation of costs of support activity of production incurred on general overhaul of the process line.

6 Conclusions

The aim of the paper was the analysis and the assessment of parameterization of value flow from the perspective of decision-making in the area of costs of the support activity. The efficiency of support processes of production is currently an important decision-making area in manufacturing companies. Due to the performed functions, it plays an important role in the process of achieving the assumed productivity. However, it generates high costs, therefore, the analysis of management of the available machinery stock must provide the information essential for taking right decisions bringing about an increase in productivity of the possessed machinery and equipment.

Various aspects of the problem concerning decisions in the area of parameterization of value flow brought about that in the paper there have been presented only a few of them. Some of the considerations have been presented from a general point of view which, on the one hand allows to highlight the complexity of the discussed problem and, on the other, is the inspiration for further studies. The empirical studies were conducted on the basis of the descriptive analysis and the analysis of the trend of the data shared by the surveyed company.

References

- [1] Borkowski S., Selejda J., Salamon S., *Efektywność eksploatacji maszyn i urządzeń*, Wyd. PCz, Częstochowa, 2006.p.96-97.
- [2] Borowiecki R., *Analiza gospodarowania środkami trwałymi*, w: *Analiza ekonomiczna w przedsiębiorstwie*, Wyd. AE we Wrocławiu, Wrocław, 1995.p.281.
- [3] Dobija M., *Rachunek kosztów*, PWN, Warszawa 1996.p.23.
- [4] Drury C., *Rachunek kosztów*, PWN, Warszawa 1995.p.38.
- [5] Duraj J., *Podstawy ekonomiki przedsiębiorstwa*, Polskie Wydawnictwo Ekonomiczne, Warszawa, 2000. p.498-500.
- [6] Duraj J., *Podstawy ekonomiki przedsiębiorstwa*, Polskie Wydawnictwo Ekonomiczne, Warszawa, 2000. p.502.
- [7] Dyduch W., Bratnicka K., *Strategiczna przedsiębiorczość: koncepcja i pomiar*. [in:] *Zarządzanie strategiczne. Rozwój koncepcji i metod*, R. Krupski (ed.), Prace Naukowe WWSZIP, Nr 27 (2)2014.pp.35-39.
- [8] *Encyklopedia biznesu*, pod red. W. Pomykała, Fundacja innowacji, Warszawa, 1995.p.183.
- [9] Griffin R.W., *Podstawy zarządzania organizacjami*, PWN, Warszawa 2000.p.291.

- [10] Grudzewski W. M, Hejduk I. K., Sankowska A., Wańtuchowicz M., *Sustainability w biznesie, czyli przedsiębiorstwo przyszłości. Zmiany paradygmatów i koncepcji zarządzania*. Poltext, Warszawa 2010.p29.
- [11] Lewandowski J., *Zarządzanie środkami trwałymi i gospodarką naprawczą w przedsiębiorstwie*, Wydawnictwo MARCUS s.c., Łódź, 1997.p.30.
- [12] Łucki Z., Filipowicz P., Stach I., Wąchol J., *Badanie operacyjne*, AGH, Kraków 2008.p.7.
- [13] Niziński S., *Eksploatacja obiektów technicznych*, WSI, Warszawa-Sulejówek-Olsztyn-Radom, 2002.p.184.
- [14] Niziński S., *Eksploatacja obiektów technicznych*, WSI, Warszawa-Sulejówek-Olsztyn-Radom, 2002.p.67-68.
- [15] Nogalski B., *Modele biznesu jako narzędzie reorientacji strategicznej przedsiębiorstw*, MBA 2/2009,
http://www.google.pl/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCoQFjAA&url=http%3A%2F%2Fjml2012.indexcopernicus.com%2Ffulltxt.php%3FICID%3D1064004&ei=CCvIUvVDzJKFB9LagKAB&usg=AFQjCNG7LD Fomy3D8IzAQI0USaNH_sp24w, p.4.(accessed on 29.08.2014).
- [16] Nowodziński P., *Zarządzanie strategiczne współczesnym przedsiębiorstwem. Otoczenie a Strategia*, Wyd. PCz, Częstochowa 2013.[see:]p.128.
- [17] *Podstawy wyborów strategicznych w przedsiębiorstwie*, red., E. Urbanowska-Sojkin, PWE, Warszawa 2011.p.20.
- [18] *Podstawy wyborów strategicznych w przedsiębiorstwie*, red., E. Urbanowska-Sojkin, PWE, Warszawa 2011.p.19.
- [19] *Procesy informacyjne w zarządzaniu*, red. nauk., A. Nowicki, M Sitarska, UE Wrocław, Wrocław 2010.p.22.
- [20] *Rachunek kosztów i rachunkowość zarządcza*, A. Jarugowa (ed.), SKwP, Warszawa 2000.p.25.
- [21] Romanowska M., *Przełomy strategiczne w przedsiębiorstwie*, „Studia i Prace” Kolegium Zarządzania i Finansów SGH, z. 98, Oficyna Wydawnicza SGH, Warszawa 2010. p.12.
- [22] Skowron-Grabowska B., *Business Models in Transport Services*, Przegląd Organizacji, 2014, nr 1.pp.35-39.
- [23] Stoner J.A.F., Freeman R.E., Gilbert D.R., *Kierowanie*, PWE, Warszawa 2001.p.246.
- [24] Tomski P., *Nowe paradygmaty w zarządzaniu przedsiębiorstwem a działania kadry menedżerskiej*, [in:] *Zarządzanie w XXI wieku, Przedsiębiorczość i Zarządzanie*, SAN, Warszawa 2013.[see:]p.165.
- [25] Wanielista K., Miłkowska I., *Słownik menedżera*, Wyd. Naukowo-Techniczne „Fraktal”, Wrocław 1998.p193.
- [26] Wrotkowski J., *Organizacja działalności remontowej w przedsiębiorstwie przemysłowym*, PWE, Warszawa, 1997.p.45.