

Factors determining the level of innovation smelting company

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ABSTRACT

Purpose: The aim of this research was identification and estimation of prospects for innovation development in a metallurgic enterprise. The enterprise wanting to hold its position must constantly aspire to improve quality of the processes realized in its range, at the same time aiming at their innovativeness. Only strong motivation in favour of the quality improvement and awareness of importance and role of the work performed by the personnel according to the taken policy will allow to gain the intended effects in range of the manufactured goods and rendered services. The enterprises under analysis fully appreciate the issue of innovativeness and operates in favour of elaborating and perfecting methods of its assessment. In the article I presented a short specification of the metallurgical branch. Particular attention is paid to the issue of innovation in the sphere of production. On the basis of the chosen enterprise I touched upon a question of innovativeness, its grounds, causes and reasons of introducing it. The criteria of measurements of the research areas used by the enterprise under analysis were also presented. Moreover, the analysis of the obtained results of one research area was made and the obtained results were presented with Pareto-Lorenz radar diagram.

Design/methodology/approach: The performed survey show the results and opinions of 20 staff members on a single shift and 2 principals (masters). The research elaborated in the survey based on ranking assessment relate also to mobility (innovativeness) of the staff, their satisfaction and self-assessment. For the needs of the analysis of the innovation level of the analyzed workplace (one of its areas), only the chosen elements of the survey have been elaborated. Within the framework of this area the following criteria have been distinguished: Cooperation with research centres, researchers, inventors (WN), Technology of production in use (T), Technical equipment (WT), Qualification/involvement of the staff (KP).

Findings: The answers given by the respondents oscillated among the areas of the technical equipment and the cooperation with research centres. This research revealed the lack of contact with researchers on the direct production level. The situation is different in case of the principles, while it is true that they did not rate using the highest possible rank in scale, they did not give a negative answer either. The barriers in processing the innovations in the enterprise, which the interviewees have indicated, confirm this analysis.

Practical implications: These studies identify areas of innovation and opportunities for its development in companies.

Originality/value: The research performed by both the principal and the staff, using the ranking method of estimation of the innovative possibilities, reveals those factors which ought to be improved in a particular area, in order to increase innovativeness of the production processes.

Keywords: Innovation; Enterprises; Research ranking; Survey; Pareto-Lorenz diagram

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1. Introduction

Innovativeness is one of the determinants of a modern enterprise. It is perceived as a change in the whole enterprises management system which places among the most difficult areas, for they concern people, their habits, mannerism, modes of action.

Nowadays there should be no doubt whether it is right to change ourselves or not. It is necessary for us to change in order to survive and to prosper in a situation of constantly changing environment, its conditions and requirements. Thus we must constantly introduce changes in the field of organization, management, methods of motivation or ways of solving problems, as well as technology. The leaders face the fundamental question - how to change in a way that the results of these changes were possibly least harmful economically, socially and politically, but they beneficial and profitable. Such thinking strategy leads to a constant search of different, more efficient means of introducing changes in management.

World tendencies in management sometimes force the managers to revalue their personal theories, that is, all they have been doing for many years and what made them successful. New solutions are the scientific response to violent changes in the organization's activity and its environment. The point is that it is not enough to pay attention merely to what we like among the world trends, but we must learn to recognize these aspects which may help the enterprise survive in such turbulent times of the current age [1,2].

In modern times with the cut-throat competition leading the company has become a true art - very complicated at times. There is no room for mistakes here. Even the slightest organizational lapse can cost a lot. The more opportunities of internal system change there are, the more chance we have to adjust to the changing environment. The enterprise is perceived as a system, whose organizational structure is one of the elements which should be especially susceptible to changes.

Only a small group reaches the threshold of success. Not many companies arrive at this point marked by economic indicators. The source of success is in the hands of go-getters who create innovations, search for new markets and learn from life experiences how to solve practical problems in leading business.

In terms of market economy, regarding its processes of globalization and growing competition, the role of management increases in the whole enterprise system. Increasingly, taking actions concerning the enterprise, we must consider the fact that management is an indispensable element deciding about its presence in the market [3].

The modern market imposes new and more specialized conditions on businesses, forcing more competitiveness from them. The rival supremacy in the market is strongly conditioned by property elaborated and implemented strategy aiming to perfection the process of the offered products or services. The importance of appropriately adopted strategy plays an essential role in the way of enterprise management. Therefore, enterprises should be aware that production, consumer service and communication can influence the increase of value added for the client, and at the same time to effective difference from the competitor in the market [3,4].

The company's success in the competitive market depends strongly on its innovative potential. That is why it is so important to evaluate it. There are many methods of measuring the level of the enterprise's innovativeness. The proposal of EFQM is worth attention - based on a coherent model of excellence, which is distinguished by nine criteria of excellence in managing the enterprise (The EFQM framework for Risk Management, 2005, p. 6). They are orientated to estimate a current situation in the enterprise. Each of the nine criteria is taken into account in defining a potential of a given organization i.e. (The EFQM framework for Innovation, 2005, p. 18-26):

- Leadership,
- Politics and strategy,
- People,
- Partnership and resources,
- Processes,
- Consumers and results,
- People and results,
- Community results,
- Basic results of the activity.

This constitutes the first fundamental point on the way to create competitive supremacy on the market. As M.E. Porter claims, the competitive supremacy must be singled out especially in capability to be innovative, to constant upgrade of its level and, thanks to this, achieving the appropriate effectiveness [5].

The enterprise which wants to be innovative, wants to have a chance for success, must create a venturesome team managing according to a specific inner system. It must choose a policy which will make the whole enterprise billing for innovations and will create habits characteristic for innovativeness and entrepreneurship [2].

2. The essence of innovation

In modern capitalistic economy innovativeness is a concern of much significance. The innovation is understood as creating new ideas or application of the existing solutions in new situations, resulting in improvement of service, programmes, structures, a product and/or system.

A modern company must be a creative organization. Thus, it should react to the competition's activity with new products, forms of marketing, etc. A creative company has power to create new concepts, or ideas or new perspectives on the already known ideas. „Creativity - says Ross A. Webber - we shall understand as generating the idea” [6]. Whereas the idea, used for realization of a given concept, may bear fruit in form of making up innovations, i.e. rendering a new article or service, a new process, a new structure, a new method. While *J. Schumpeter claims that innovation means* [7]:

- perfecting the hitherto manufactured products and introducing new ones,
- introducing new methods of production and perfecting the hitherto used ones,
- activating and opening new markets,
- activity leading towards modernization and usage of new ways of sale,
- modernization in range of produce organization,
- the use of new kinds of resources and materials.

The essence of these definitions is perceiving innovation as a change. From the enterprise's perspective, literature lists seven sources of innovation. The first four sources are found inside the organization and these are: an unexpected event, incompatibility between reality and the idea, a need for a particular process, changes in structure of the industry or market.

The rest three sources of chance for innovation depend on the changes in the environment of the enterprise or the industry, these are: demography, changes in ways of perceiving, moods and values, and new knowledge.

The organisation that wants to keep their position on the market and be competitive, must be capable of creating innovations.

Innovation can thus take up various forms, it can also be understood in various ways, depending on the branch of knowledge, in which such a concept is used, moreover, on the subject of research and its aim, which it is supposed to serve. Innovations are not only differently described, but also differently classified. Among the criteria of their division we can distinguish [8,9]:

- originality of changes,
- scale of size,
- sources of innovations,
- level of complexity of the innovative process,
- psychosocial circumstances,
- range of interaction,
- sort of knowledge,
- influence on the environment.

Depending on the area in which they are created or put into practice, the innovations are divided into: the product ones, the process ones (technological), the organizational ones and marketing ones.

3. Conditioning deciding about the level of innovativeness of a metallurgical company

The enterprise under analysis deals with production and rendering merchandise services related to metallurgy. The main recipients of the offered products is building, shipbuilding and energetic (boiler) industry. Regarding this, the enterprise wishing to keep its position must constantly aim at improving the quality of the processes realized in the enterprise, with concurrent aiming at their innovativeness. Only strong motivation to improve the quality and awareness of the importance and role of the work which the personnel performs in a chosen policy will allow to achieve the intended effects in range of the manufactured articles and rendered services.

3.1. Characteristics of non-material resources taking part in the process of assessing the level of the enterprise's innovativeness

The innovativeness of the manufactured articles depend highly on the enterprise's resources. These include material and non-material elements which constitute a particular system.

The material ingredients of the resources are physical resources such as buildings, devices, machines, raw materials, products, and also financial resources of the organization being in its possession and possible to possess. The non-material resources are managing and technological skills, composed of skills of the individuals, groups and their organization. Moreover, such resources as the enterprise's name, tradition, company's trademark, company's contacts, location. The company's skills play an extremely important role in innovativeness of the manufactured articles and are composed of knowledge and experience of a board of directors, intermediary personnel, research and development area staff and technician and workmen. The enterprise fully appreciates the concern of innovativeness and performs activity towards earning and perfecting methods of its measurement. The analysis of the non-material resources of the enterprise has been performed in a chosen Works and Steel Foundry. The performed survey show the results and opinions of 20 staff members on a single shift and 2 principals (masters). The research elaborated in the survey based on ranking assessment relate also to mobility (innovativeness) of the staff, their satisfaction and self-assessment.

For the needs of the analysis of the innovation level of the analyzed workplace (one of its areas), only the chosen elements of the survey have been elaborated.

The analysis of the structure of employment

For the purpose of the analysis of the employment structure the survey contains a question to a respondent regarding male or female sex, education, age, job tenure, current employment and mode of employment. After the performed analysis we can conclude that In the workplace we find mostly male staff, 86% of whom have vocational education, which is a dominating number for it equals 68% of all the staff members. One can also notice that the department has a large number of staff with primary education - 5%. An important aspect is the age of the personnel, which results in their job tenure, and, furthermore, their experience, 59% of the staff works 15 years - and more, the second place, regarding the length of the job tenure, is occupied by the staff members having worked for 11-14 years, that is 23%.

The current employment is most often the first employment of the workmen. It comes to even 64% of all the employed staff. The respondents for whom the current employment is the second one and the third one amount 18%. The last aspekt of the analysis of the employment structure was the mode of staff employment. Most of them, which is 59%, have been employed in a normal mode. However, the remaining 27% are the Staff members who have joined the workplace in principle of transfer.

Identification of the importance of the areas

For the purpose of the assessment of realization of the innovative processes, chosen areas have been identified, i.e.: competence of the staff, reasons for introducing the innovations, limitations in introducing the innovativeness, general opinion about the enterprise, sources of knowledge about the innovations, factors influencing the innovative activity in the enterprise, barriers in processing innovations in the enterprise, sources of successes in the enterprise, and then criteria of assessment of each of them have been defined.

Below we present the detailed analysis of one of its areas - potentiality of innovation development in the enterprise.

Within the framework of this area the following criteria have been distinguished:

- Cooperation with research centres, researchers, inventors (WN)
- Technology of production in use (T)
- Technical equipment (WT)
- Qualification/involvement of the staff (KP)

For the purpose of assessing the importance of the criteria of the given area, a ranking method has been used. The obtained results have been presented in Table 1.

Table 1. Presentation of the assessment results

Rating	Factors			
	WT	T	KP	WN
1	1	5	2	12
2	4	3	7	6
3	13	4	1	2
4	2	8	10	0

The interpretation of the performed research has been presented graphically with the use of radar diagrams (Fig. 1) and the Pareto-Lorenz type (Fig. 2).

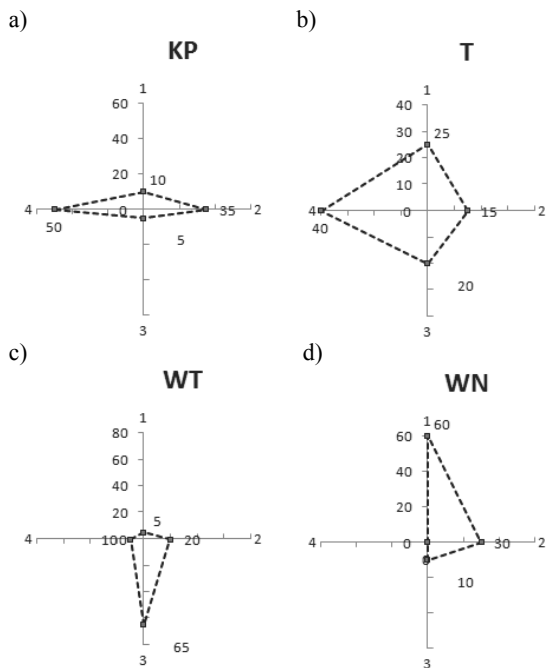


Fig. 1. The radar diagrams - structure of the importance assessment for: a) KP, b) T, c) WT, d) WN

After the analysis of the obtained results we can conclude that 75% of the respondents assessed technical equipment levels as good and very good. In case of the second criterion (used technologies) the responses were much varied. Contrary, half of the respondents assessed the qualification of the staff as very good. Unfortunately,

a large number of the interviewees did not assess well the analyzed enterprise in regard of cooperation with research centres. It is the least assessed criterion and there is no doubt that this area of the enterprise's functioning must be improved.

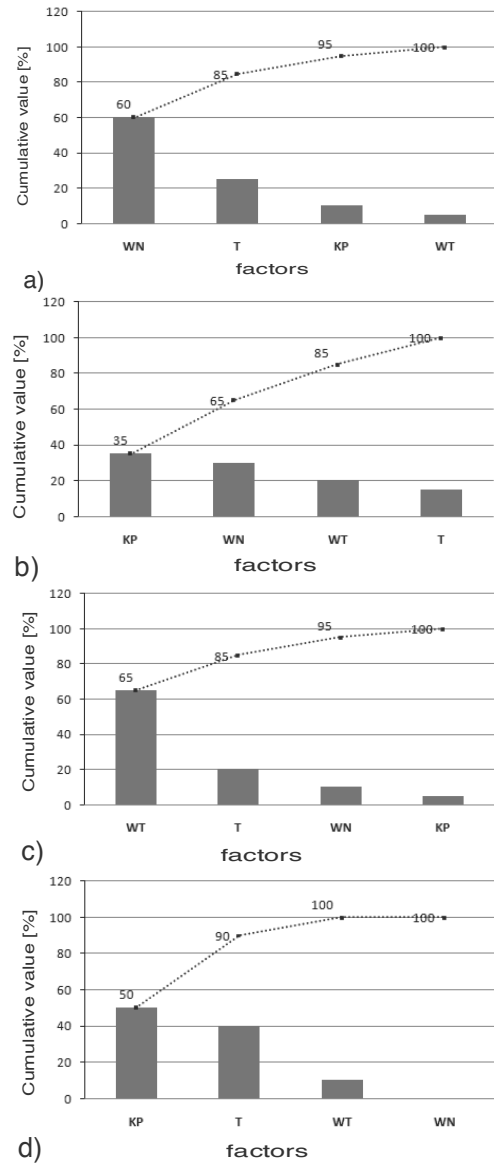


Fig. 2. The Pareto-Lorenz diagrams of the importance of the factors in the assessment: a) „1”, b) „2”, c) „3”, d) „4”

This research confirmed Lack of information and direct cooperation of the production personnel with researchers and inventors. However, we must remember that practical suggestions received from the staff directly involved in production are an important factor contributing to the technological - organizational development of the enterprise. Downplaying the remarks coming from the production area or omitting them in cooperation process may result in decrease of competitiveness of the enterprise.

Moreover, attention must be paid to the importance of assessment of the used technologies. In this area the assessment was much varied, which confirms lack of awareness in the usage of the latest achievements of engineering and technology among the production staff.

The results are different in case of the direct principal staff. The survey included the personnel manager and the supervisor of the shift. The results of the performed research have been presented in Table 2.

Table 2. Presentation of the assessment results

Rating	Factors			
	WT	T	KP	WN
1	2	0	0	0
2	0	0	1	1
3	0	0	1	1
4	0	2	0	0

The interpretation of the performed research has been presented graphically with the use of radar diagrams (Fig. 3) and the Pareto-Lorenz type (Fig. 4).

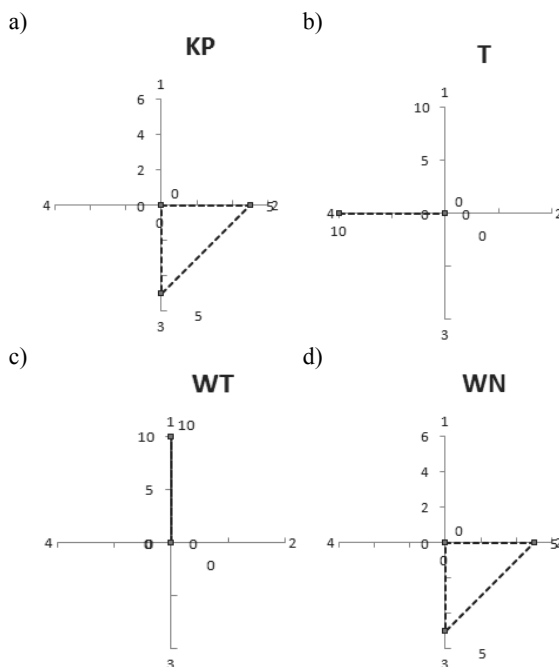


Fig. 3. The radar diagrams - structure of the importance assessment for: a) KP, b) T, c) WT, d) WN

After the analysis of the obtained results we can conclude that 100% of the respondents (principals) assessed technical equipment at the lowest level, and at the highest - the used technologies. In case of qualifications of the staff members the answers were varied. Attention must be paid to the fourth criterion (cooperation with research centres, researchers and inventors), which the principals rated as satisfactory.

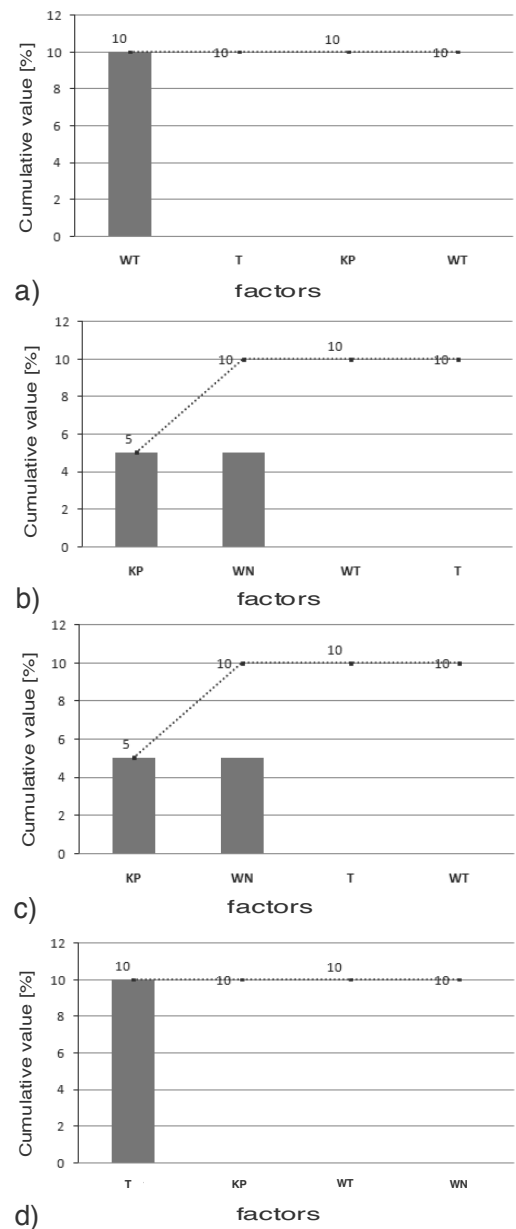


Fig. 4. The Pareto-Lorenz diagrams of the importance of the factors in the assessment: a) „1”, b) „2”, c) „3”, d) „4”

Summing up, we can state that the existing differences between the answers given by the respondents oscillated among the areas of the technical equipment and the cooperation with researchers centres. This research revealed the lack of contact with researchers on the direct production level. The situation is different in case of the principles, while it is true that they did not rate using the highest possible rank in scale, they did not give a negative answer either.

The barriers in processing the innovations in the enterprise, which the interviewees have indicated, confirm this analysis.

Among the responses listed in the research there are:

- Lack of encouragement capital and product encouragements
- Difficult access to specialists and advisors
- Difficulties in branch cooperation
- Difficult access to information concerning technical novelty
- Lack of properly qualified personnel
- Lack of time
- Insufficient technical base
- High level of failure risk
- Lack of need of introducing innovations

The largest number, reaching 62% of the interviewees, stated that the access to specialists and advisors is difficult. 20% responded that there is a lack of capital and product encouragements, whereas the remaining 18% claimed that the technical base is insufficient (Fig. 5).

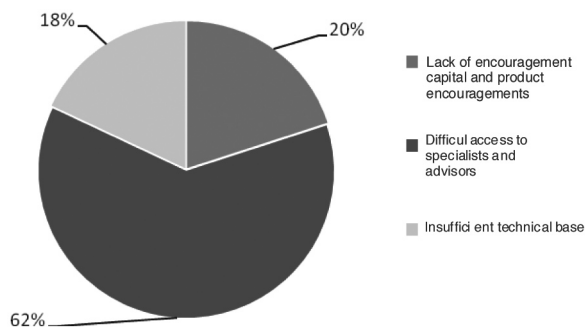


Fig. 5. Barriers in processing innovation

4. Conclusions

The performed research revealed those factors which should be improved in the given area, in order to increase innovativeness of the production processes. The conditions of property introduced changes in this range are i.a.:

- Appointing a team of personnel who shall be responsible for innovativeness trainings, understanding of the need of its

development and implementation in each particular work position,

- Improvement of the system of transforming information between particular levels of management,
- Changing the organization into an process-oriented organization,
- Elaboration and prevalence of the rationalization form,
- appointing a commission on assessment of the rationalization proposals,
- „opening a company” - a process which will allow a personal access to the whole production stage for information purpose, as well as control purpose, enabling more efficient coordination of the processes and better understanding of the needs of the staff members themselves and the clients.

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