

COMPETENCIES OF ENGINEERING STAFF IN STEELWORKS AFTER THEIR RESTRUCTURING

Received – Priljeno: 2015-03-11
Accepted – Prihvaćeno: 2015-10-10
Review Paper – Pregledni rad

In the article changes in competencies of engineering staff were presented. The key element of the competencies is metallurgical knowledge. After restructuring process the scale of competencies was widened. Particular changes after restructuring were characterized. Competencies were identified from a broad range of literature and then rated by 101 respondents, managers in terms of importance to jobs of engineers. The background for the case study was Human Resources data from ArcelorMittal, Poland.

Key words: steel enterprise, restructuring, engineering staff, knowledge transfer, network

INTRODUCTION

The sustained competitive advantage of companies derives from the competencies of their human resources. This is increasingly true in organizations where human resources are treated as strategic asset and knowledge workers are in majority. An engineering profession is such a field where engineers are required to have competencies that can be strategically employed for the firm's competitive advantage [1]. The development of individual and organizational competencies has emerged as a consequence of the continuous search for sources of performance and improving performance of employees. Since D. McClelland [2] and R. Boyatzis [3] defined the assumptions of the concept of competencies, their importance as a factor of success and a source of competitive advantage of the organization is still growing and is of interest to both the theory and practice of management. Metallurgy is an industry that requires great precision and professionalism. In this industry, the quality of the final product, in addition to factors such as technology and materials, is significantly affected by people employed. Activity of steelworks is largely based on the work of suitably qualified employees and their competencies. Therefore, in the current conditions of the functioning of companies it is important to pursue the personnel policy based on staff competencies, and to identify specific skills and behaviours that are actually related to measures of effectiveness in this organization. The following question is addressed: What are the generic competencies that engineers require for their work as engineers in the metallurgical enterprise?

THE CONCEPT OF COMPETENCIES IN THE LITERATURE

The concept of competency-based human resources has gone from a new technique to a common practice for 40 years since D. McClelland (1973) first proposed them as a critical differentiator of performance [2]. Competency is defined as an essential, fundamental characteristic, which results in effective and/or better fulfillment of professional duties. Professional competency represents the potential, an ability to perform something [3]. An individual set of competencies reflects the capabilities of a person – competencies are identified with qualities of a person who really does a good job. These include motives, personal qualities, skills, the image of oneself or one's social role, knowledge which a person uses, and a person can be aware of the existence and possession of these qualities or not. The idea of competency can go beyond skills, knowledge and standardized behaviours [3]. Competencies could also be understood as “managing a complex professional situation”, i.e. dealing with a problem that often occurs unexpectedly [4]. In this context, dealing with uncertainty, i.e. non-routine activities that require professionals to search for ways to achieve emerging goals [5], is a challenge always present in the daily engineers' work. Competencies emerge as a need to fulfill spaces of uncertainty, answering the question “What to do when no one says what should be done?” In this regard, competency development becomes a strategic issue for organization. It is essential to function effectively in professional life and pursue the objectives assigned to positions, particularly in response to dynamic changes in processes and technologies used [6].

COMPETENCIES REQUIRED FOR ENGINEERING WORK

In steelworks, the easiest skilled trade jobs are disappearing and the content of jobs already existing is en-

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riched. Consequently, the scope of professional tasks in the case of a large number of positions is significantly extended. A division into blue-collar, low-skilled positions and white-collar ones, usually occupied by people with higher qualifications has become obsolete. A trend noticeable in the industry in the steel sector is multi-skilling. This trend results from shortened production time, shorter production cycles and the need for a company to adapt to changing demand quickly [7]. In the metallurgical industry, changes in the demand for the development of specific skills is observed. Technological change, including automation and computerised production lines, requires a workforce with increased professional qualifications. In addition to technical competencies in one's area of specialization i.e. knowledge of fundamental principles and theoretical foundations of processes, procedures, and equipment, articulation of professional thoughts and presenting them at professional forums, and creative thinking skills that become a basis for out of the box solutions for significant problems [1], non-technical content is becoming essential in engineers' work, for example, communication, teamwork, personal/ attitudinal skills and attributes, problem solving and the ability to learn, attitudes and behaviours that support the project-based work model, social and environmental awareness and ethical principles. The need to enhance workers' qualifications and competencies in the steel sector has been the subject of research for a number of years in the USA, Europe and also in Poland (by i.a. S. A. Male *et al.* [8], C. Bodmer *et al.* [9], Spinks *et al.* [10], B. Gajdzik [11]; S. Kluska-Nawarecka *et al.*, [12]). The importance of human capital for sustainable future of the steel sector has been emphasised by the main representatives of steel workers' interests: the International Metalworkers' Federation (IMF) and the European Metalworkers' Federation (EMF). They have highlighted the need to invest in education, training and skills improvement [4]. The capacity to maintain skilled and secure workforce may be the only key to the success of the sector. Engineering competencies that are particularly important include: versatility and flexibility (the ability to go beyond their own narrow specialization areas), independence and problem-solving skills, self-assessment skills and the ability to analyze their own mistakes and those made by co-workers, logical thinking skills and imagination, the ability and courage to make decisions within their competence, intrinsic motivation, the ability to work under stress and cope in a crisis situation, as well as job-related competencies such as the ability to read the documentation, the ability to estimate and price information contained in projects and knowledge of programming basics, as well as practical knowledge of information technology. The optimal profile of engineering competencies should be as follows: openness to new experiences, stress management skills, analytical and conceptual thinking skills at the operational and strategic levels, innovation, creativity, project management skills,

decision-making skills, working with a multicultural team, the transfer of knowledge, motivating others, a division and supervision of work and evaluation, change management. It is important to seek to improve the quality of products, manage innovation and take care of customer service [13].

IDENTIFICATION OF COMPETENCY ITEMS

The purpose of the study was to explore the perceived competencies that are critical in engineers' work in metallurgical enterprises. The study was conducted among the managers of top, middle and operational management level in companies related to the metallurgical industry operating in the Province of Silesia (Poland). The research was conducted by means of a direct survey. The instrument of data collection was questionnaires. The questionnaires consisted of questions with a mixture of a five-point Likert-scale, multiple choice and closed-ended questions where one answer was developed. Competencies that might be desirable in engineers were identified in literature on competencies. The quantitative sample of analysing the competencies contained 101 respondents. The data were collected in April and May 2014 and first analysed using basic statistical techniques. Data analysis was accomplished using IBM SPSS Statistics 21. The competencies can be broadly classified into technical, non-technical and attitudinal. In the first part, the respondents rated 25 categories of knowledge and skills to be ranked on the Likert scale. The score for all 25 ranges was between 2,3 and 4,4 and for the top 5 the weighted average score ranged from 4,0 to 4,4. The managers ranked applicable knowledge and the ability to apply theory in practice as the most important (mean score of 4,44; 91,1 % of the respondents rated it highly and very highly, 5,4 % on the average level, only 3,5 % as poor). Technical knowledge in one's area of specialization (4,25; 83,8 %/12,3 %/4,0 %) as well as the understanding of new technologies is the basis for success for an engineer (the efficient use of operating systems, the ability to work in computer networks, the ability to select the hardware and software configuration, the ability to use peripherals) (4,38-4,09). Engineers are expected to have the ability to solve problems (mean score of 4,26; 83,5 % of the respondents rated it highly and very highly) and the ability to transfer knowledge (60,3 % rated it highly and very highly). Thinking in global terms (3,29) and negotiation skills (3,19) are less important (3,19). Non-technical content is also essential in engineers' work.. The research findings show that the application of technical knowledge in practical life requires a set of non-technical skills along with technical ones. These non-technical skills (interpersonal and social skills and specific qualities, attitudes and behaviours) refer to the capabilities that do not particularly relate to the field of engineering a person works in, but are required when one has to work in teams. Honesty and responsibility are the core requirements with highest weighted score, while leadership

skills are the least important. Employers expect engineers to have the ability to consolidate and motivate teams to work creatively rather than to be charismatic leaders. Engineers are expected to be systematic (4,51), willing to learn, to focus on self-improvement (4,39), to be independent (4,36), to have the ability to work in a team (4,35), to be creative (4,30).

THE TRANSFORMATION OF THE ENGINEERING STAFF COMPETENCY PROFILE AFTER RESTRUCTURING

This case study was based on Human Resources data from ArcelorMittal, which has been operating in the Polish steel market for 10 years (under its current brand name). The company employs more than 12 thousand workers, with the majority of them engineering and technical staff. Steelwork is a predominantly male trade, which was redefined during restructuring. During this process, attention was focused on the template of a modern engineer, who is able to combine knowledge of the area with compatible areas, in addition to having technical competencies (knowledge of metallurgy). Through training (32,4 training hours per employee) workers acquire new skills and competencies. Figure 1 shows the pyramid of the scope by personnel structure [14]. Competency profiles have been divided into four

thematic areas. The first area concerns metallurgical (job-related, technical) knowledge. The second area includes organizational and administrative competencies. The third area is special competencies e.g. environmental protection, safety and health etc. The fourth area is managerial competencies. For each such type, the number of training hours completed in 2013 is also given. Before restructuring, an engineer was primarily equipped with expertise in the areas of metallurgy or machinery operation. Engineering posts (staff with higher education qualifications) were reserved for executives.

Production engineers occupied the positions of controllers. Their duties included supervising the production. Currently, engineers work directly in production and are members of said teams. The position of an engineer has become more popular. Employees who did not have engineering qualifications completed them during the period of economic transition. Also, the position of engineering manager is something of a novelty. Prior to restructuring, management knowledge was attributed to executives; after restructuring engineers are graduates of technical universities, including management graduates [15]. It should also be highlighted that a modern engineer should know at least English metallurgical terms. Figure 1 shows the level of foreign language skills amongst metallurgical staff.

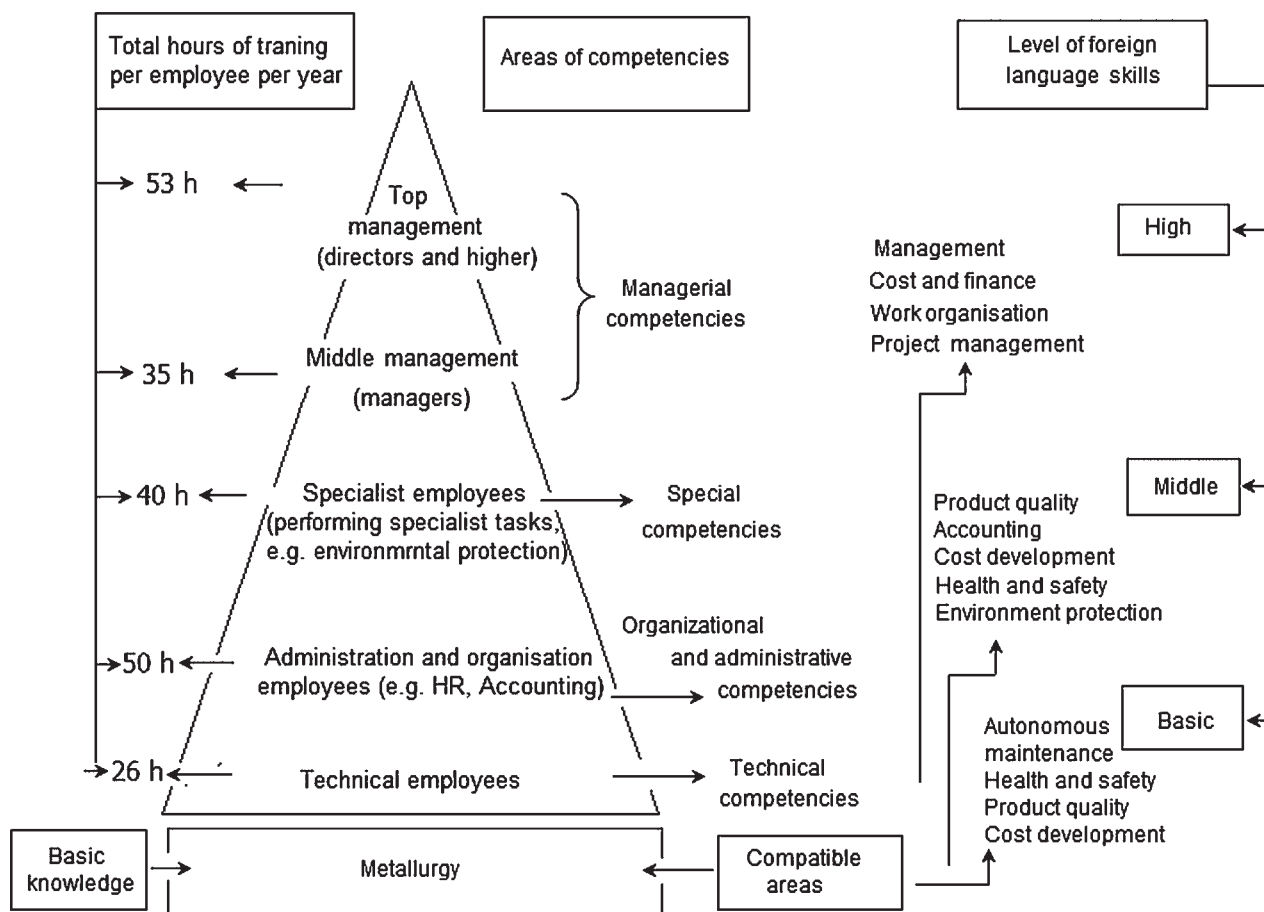


Figure 1 A competency profile of metallurgical staff [14]

CONCLUSIONS

Engineers require strong technical capabilities in their respective disciplines as well as a very balanced blend of soft skills including but not limited to interpersonal skills enabling them to interact with people at all levels, communication and coordination skills, the ability to articulate complex ideas in presentations, to come up with out of the box solutions and to bring other people on board. Engineers are expected to have a blend of hard core engineering skills as well as a great number of soft skills to transform an engineer into a well sought out professional, capable of delivering projects which are technically superb and satisfying for clients. Competencies were identified from a broad range of literature and then rated by 101 respondents, managers in terms of importance to jobs of engineers. The results indicated that non-technical, attitudinal and technical competencies were perceived to be important.

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Note: The responsible translator for the English language is B. Borkowska-Kępska, Dabrowa Gornicza, Poland