Competences of Engineers in the Iron and Steel Industry

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Abstract. The article presents the results of assessment of the professional performance of engineers working in the iron and steel industry. A competence-based profile of highly-qualified professionals has been built. The study of the competences of the iron and steel industry engineers has shown that their knowledge and skills may be mobilized to solve professional tasks.

1. Introduction

Along with investment opportunities, another key factor for successful upgrading and increasing competitiveness of the iron and steel industry products in the global market is the highly-qualified personnel capable of initiating and implementing innovations.

One of the internal factors of the Russian iron and steel industry that hinders its development is related to the emergence of the negative trend characterized by aggravating the problem of supply of highly-qualified personnel for iron and steel companies. Having in place a national competences system would make it possible to secure personnel selection and training, as well as timely identification of new skills requirements. In Russia, the national competences system is still under development.

Many authors both in Russia and abroad identify different types of competences, for example, papers [1 – 3] consider two groups of competences – professional competences and social competences, papers [4 – 8] – special competences and general competences or hard competences and soft competences. Most researches are aimed at the study of social (general, or soft) competences, with significantly fewer works focused on professional (special, or hard) competences. Various competence-based approaches to assessment of the high-technology companies personnel are being developed [6, 9, 10], levels of knowledge and skills required in the engineering labor market are being evaluated, benchmark studies of engineering competences demand and supply in Russia and the EU countries are underway [4]. The European Centre for the Development of Vocational Training (Cedefop) [11] conducts broad-scale researches related to competences assessment and forecasting personnel competences demand in Europe.

2. Methodology

For the purpose of efficient implementation of HR policy in the iron and steel industry, which technical-and-economic level determines the development strategy for the whole economy, of vital importance are the tasks of selecting and training highly-qualified personnel with regard to the demand for new skills for implementation of technological innovations.
In the absence of a system solution for assessment of professional performance of engineering personnel it is not possible to simply apply the existing competence-based approaches. Individual mechanisms which are already in use [12] – getting feedback from employers, identifying a mismatch between demand and supply in the labour market – may be combined to identify and assess professional competences. The use of these tools allows identifying a relation between the obtained qualification and the job profile, additional training needs of qualified specialists to succeed in the labor market, frequency of using various forms of continuing vocational training by graduates, existing demand for additional knowledge and readiness to get such knowledge. It is important to perform competences examination. This is done by conducting a questionnaire survey among groups of respondents with the use of the following three main approaches [13]: 1) analysis of the answers to indirect questions about the value of a university degree, professional experience, level of satisfaction by the received professional education; 2) competence measurement by descriptors describing the relevant routines (professional duties, main activities or specific activities at the work place); 3) direct assessment (self-assessment) of the competences a respondent possesses or of the required competences.

3. Results and analysis

The above methods and approaches were tried out for assessment of professional competences of the engineering personnel employed at Severstal Russian Steel division of Severstal. Competences assessment involved analysis of skill levels and personal properties of respondents. We used the tools that were applied in the European research “REFLEX” [14] and in paper [4], including self-assessment of competences by the respondents against the proposed list and on a common scale. The developed list of competences covered by the research is given in Figure 1.

In order to match the existing skills with the required skills the respondents were asked the following questions: “How would you characterize your level of the following knowledge and skills?”, “What level of the mentioned knowledge and skills does your job require?”. The self-assessment procedure covered 24 skills and was carried out based on the same 7-point scales. The following groups of competences were analyzed: a) instrumental competences including professional knowledge and communicative skills; b) interpersonal skills reflecting functional flexibility and ability to work in a team; c) system competences reflecting ability to mobilize the existing resources, ability to perceive the new, managerial skills. Focus was placed on the analysis of general (soft) competences reflecting the level of proficiency in the use of social, communicative and managerial tools and lifelong learning ability. It should be noted that soft skills are inseparable from hard skills, and are also professional skills, while not relating to one profession only.

The competence-based profile of the highly-qualified personnel plotted on the basis of the average score of the sample group is shown in Figure 2. The results of the survey show that the engineers give high scores to almost all of their knowledge and skills being evaluated: the scores given by the respondents were seldom lower than 5 on the 7-point scale. A similar trend is observed when it comes to the required competences. The required level of competences exceeds the existing one, it was only in a few cases that the respondents stated that their level of skill was higher than required. The biggest gaps between the existing and the required level of competence are observed for the ability to talk on professional topics in a foreign language and the ability to sell products or services.

The results of the study of competences of the highly-qualified personnel in the iron and steel industry show that the engineers are active in their professional lives, focused on their professional development and career advancement, and committed to work in the iron and steel industry.
Figure 1. Classification of the engineering personnel competences.
4. Conclusions
The conducted research makes it possible to state that under present-day conditions higher school students should develop their organization and self-organization skills, effective communication skills, ability to perceive the new and learning ability in order to be successful and in-demand. Possessing these skills will make it possible to close the gap between the existing and the required competences. Considering that such competences as professional agility, results orientation and commitment to teamwork are being increasingly demanded, having just technical knowledge and skills to solve highly specialized engineering problems is no longer enough for the current labour market of the iron and steel industry. It is required to actively involve engineering personnel in innovation processes, such as development and adoption of advanced technologies for making steel grades with totally new or significantly enhanced properties.

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