

EXPECTED EMPLOYEES' COMPETENCIES IN THE PROCESS OF LAUNCHING NEW PRODUCTS IN JZR LTD.

Adam GUMIŃSKI^{1*}, Katarzyna DOHN²

¹ Silesian University of Technology; adam.guminski@polsl.pl, ORCID: 0000-0001-8250-7101

² Silesian University of Technology; katarzyna.dohn@polsl.pl, ORCID: 0000-0002-4178-1347

* Correspondence author

Purpose: The article presents the research results concerning employees' competencies in JZR Ltd. (Jastrzębskie Zakłady Remontowe Ltd.). Human resources management directly affects the operational results of the activity of a manufacturing company. The managers need to recruit employees possessing a high level of competencies. The key expected result is better economic effects. The JZR Development Programme is a good example of the complexity of processes that should be taken into account in good decisions in the area of human resources management in an activity of a manufacturing company. The main purpose of the research was to identify and analyse key employees' competencies needed to launch new products on the market. The specificity of machine-building enterprises determines the scope and scale of the necessary activities for efficient and effective human resources management.

Design/methodology/approach: The objectives of the research were achieved by the analysis of a recruitment process executed in the JZR Development Programme and a questionnaire survey within the project "Development of the skills ecosystem in four countries of the Visegrad Group".

Findings: It was found that key elements determining the productivity level of the JZR Development Programme are the high technical and soft competencies of new employees. A risk analysis is also of high magnificence in so complex and capital-consuming projects.

Research limitations/implications: The research limitations are due to the complexity of the system, the difficulties arising from the specificity of the mine environment, the lack of the possibility of ongoing diagnostics of the entire infrastructure (e.g. pipeline specification, the ability to measure sediment in water galleries, smooth change of the speed of drive mechanisms, etc.).

Practical implications: The analysed investment programme requires workers specializing in the construction and designing of scraper conveyors, belt conveyors and powered supports. Soft skills such as teamwork skills or knowledge of project management methods and tools are highly needed as well. The activity of JZR Ltd. needs specialized software in the field of machine construction in terms of technology and design.

Social implications: The expected requirements are strictly connected with IT skills which should be developed within the education process, especially at technical universities. Manufacturing companies like JZR Ltd. need to participate actively in creating the profile of a graduate at universities. Another possible activity could be achieved by cooperation with a potential candidate for work in a manufacturing company.

Originality/value: The value of the research is the identified requirements in the range of analyzed technical and soft competencies which could be treated as a benchmark for similar complex manufacturing development projects. According to what was analyzed in the area of literature review we were able to find, there are no specific studies referring and reporting on employees' competencies required in projects in mining industry.

Keywords: human resources management, employees' competencies, work performance, machine-building enterprise, new products.

Category of the paper: research paper, case study.

1. Introduction

Manufacturing companies need to undertake new investment projects to develop. These projects should be well-planned and adequately financed. One of the key aspects is to plan and recruit employees whose competencies were adjusted to the needs of the developed projects and the operational activity. The recruitment process is difficult and cost-consuming.

The developmental project launched under the name of the JZR (Jastrzębskie Zakłady Remontowe) Development Programme is an insourcing process within the JSW Capital Group, i.e. direct supplies of products to coalmines whose production is carried out within the capital group. The JZR Development Programme is aimed at achieving strategic objectives on both JZR and JSW sides, among which the production of 5 products which can be considered crucial i.e. scraper conveyor elements, main pipelines, belt conveyor rollers, suspended track rails and sections of powered roof support (Gumiński et al., 2020).

The main purpose of undertaken research, given in this article, was the analysis of employees' competencies expected in the JZR Development Programme, which is a development investment executed by a production and service company i.e. JZR Ltd. The main scientific problem focuses on the identification and analysis of key employees' competencies in the analysed programme. As a result of the study, the authors suggest actions be undertaken to recruit the best-adjusted employees within the JZR Development Programme.

The results concerning employees' competencies within the JZR Development Programme of university graduates expected by JZR Ltd. are part of the project "Development of the skills ecosystem in four countries of the Visegrad Group". The research study within the project proves that the main impact concerns requirements in the field of technical competencies (reported by over 50% of respondents) and in the field of economic competencies (reported by over 20-30% of respondents). Marketing or management competencies are required to a lesser extent (indicated by 10-20% of respondents).

Competences in the ITC area are becoming particularly important and their importance can be expected to increase in the coming years. As a result, it is a great challenge for the appropriate reorientation of the scope and forms of education at universities; this applies to both university and polytechnic education.

2. The characteristics of the JZR Development Programme

The enterprises of the machine building industry have specific features, which generate an increased risk level in the activities of these enterprises, among which should be distinguished (Dohn, Gumiński, Zoleński, 2011):

- ✓ production processes have a tooling and assembly character of high complexity, requiring advanced technology and technical facilities,
- ✓ a significant share of unit production requires a stable technological and construction base for the execution of contracts, mainly highly qualified engineering and technical staff as well as IT infrastructure,
- ✓ effectiveness of functioning of machine-building enterprises depends on appropriate knowledge about suppliers and co-operators,
- ✓ due to high uncertainty and variability in the use of production capacities, there is a need to maintain surpluses in the technical infrastructure (machines, equipment) while balancing the staffing needs of the contract portfolio being realized,
- ✓ implementing favourable contracts requires a careful analysis of many parameters depending on macroeconomic and microeconomic conditions.

JZR Ltd. is a company which since 1993 has provided facilities for the renovation and modernization of machinery and equipment used in the production plants of JSW Capital Group, mainly coal mines. The concept of the JZR Development Programme was prepared in response to the needs of JSW, which strives to ensure stable supplies of machinery and equipment necessary for the ongoing operations of the company's coal mines. The main goal of the JZR Development Programme is to expand production and renovation activities in the scope of delivering ready products to JSW production plants. The key assumptions of the JZR Development Programme were defined as follows (Gumiński et al., 2020):

- ✓ the target production: 5 products, i.e. armoured conveyor elements, main pipelines, belt conveyor rollers, suspended track rails and sections of powered roof support (presented in table 1),
- ✓ location: Suszec Community,
- ✓ additional employment: about 200 skilled workers, mainly welders and CNC operators,
- ✓ using specialized machines and devices, mainly CNC machines and welding robots, to optimize the demand for new employees,

- ✓ estimated capital expenditures: 95 mln PLN (modernization/construction of facilities, including production halls and their equipment),
- ✓ sources of finance: capital from JSW Capital Group with the contribution of the land and production halls in the area of Suszec, own funds of JZR Ltd. and co-financing deriving from operational programmes.

Table 1.

The list of planned products in the JZR Development Programme

No.	The planned product	The visualisation of a product	The start of production
1	2	3	4
1.	Armoured conveyor elements		August 2020
2.	Main pipelines		August 2020
3.	Belt conveyor rollers		August 2020
4.	Suspended track rails		August 2020
5.	Sections of powered roof support		January 2021

Source: own preparation (based on project documentation of JZR Development Programme).

The JZR Development Programme's Project Team consists of the representatives of JZR Ltd. JSW Capital Group and JSW Innovations Ltd.

In Fig. 1. the structure of the manufacturing halls and the equipment within the JZR Development Programme are given.

Achieving the assumed objectives of the JZR Development Programme is going, in the medium-term perspective, to enable strengthening the competitiveness level and increasing the market value of both JZR Ltd. and JSW Capital Group.

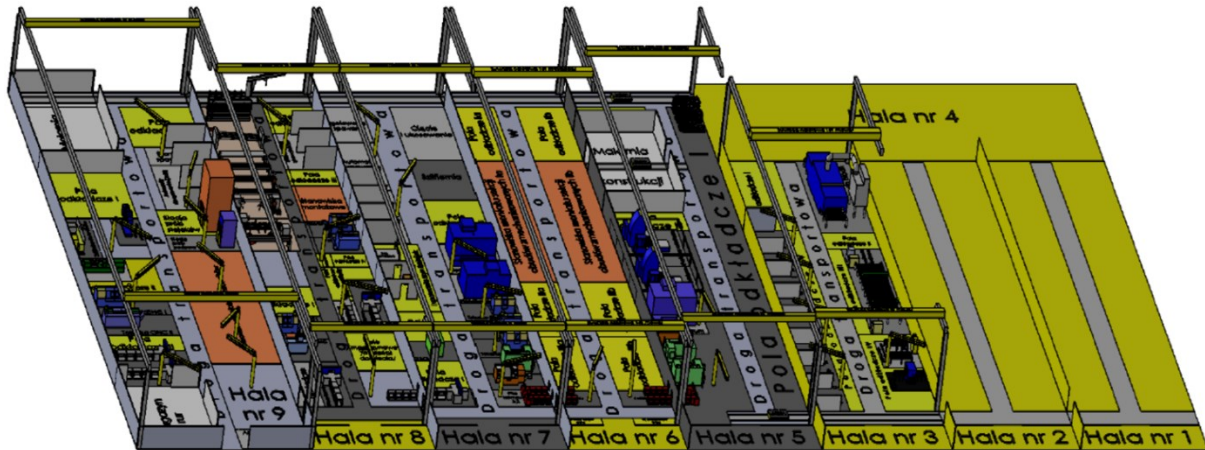


Figure 1. The concept of the halls' development.

Source: own preparation (based on project documentation of JZR Development Programme).

3. The planning process of human resources needs in a manufacturing company

From the point of view of the economically efficient activity of a company, the optimal use of the resources involved in its operations is of key importance. Maintaining a high level of resource productivity requires identification, evaluation and actions limiting the negative effects of operational risk factors. This often means the necessity to engage additional resources due to specific internal and external conditions for the stable functioning of the entire manufacturing system.

Various aspects of resource productivity in manufacturing companies are of interest to researchers who analyse this issue, pointing to its determinants and changes in its level as a result of technical and technological or organizational progress. Numerous studies (Hottenstein, Dean, 1992) are also undertaken on quantitative measures of productivity, which usually represent the relationship between economic effects and inputs (the company's resources involved).

Various indicators reflect the relationship between effects and inputs, e.g. the synthetic economic indicator - return on equity (ROE) representing the net profit earned on the company's equity) or the production indicator machine productivity (as the number of products produced per company). per machine).

The most frequently used measures of resource productivity in a manufacturing company include the following (Mazurek, 2014; Relkar, Nandurkar, 2012; Simões, Gomes, Yasin, 2011):

- *OLE - Overall Labour Effectiveness.*
- *OEE - Overall Equipment Effectiveness.*
- *KPI - Key Performance Indicator.*
- labour productivity indicators.

Overall Labor Effectiveness (OLE) is a key indicator that measures the workforce's utilization, efficiency and quality and its impact on the productivity of a technical system. It is an indicator similar to Overall Equipment Effectiveness (OEE), taking into account the following elements characterizing work resources:

- availability of work - share an employee's effective working time on a working day,
- work efficiency - the share of tasks performed about the standard level,
- quality of work - the share of tasks performed without any errors or interruptions in the total number of tasks performed.

OLE allows you to make the right operational decisions thanks to the analysis of the cumulative effect of the three above-mentioned labour resource efficiency elements.

Overall Equipment Effectiveness (OEE) is the most important element of the quantitative evaluation of the TPM (Total Productive Maintenance) strategy. This indicator can be determined based on the relationship (Loska, 2013):

$$OEE = D \cdot E \cdot J \quad (1)$$

where:

D – availability of the machine (fixed asset) taking into account the available working time,

E – the efficiency of the machine (fixed asset) operation taking into account the operational time work,

J – the quality of operation of the machine (fixed asset) taking into account the number of processed items elements minus the number of defects.

Among the numerous group of indicators relating to the efficiency factors, one can indicate the key efficiency factor KPI - *Key Performance Indicator* (Jonek-Kowalska, Tchórzewski, 2016), which includes 71 indicators for assessing the effectiveness of machinery and equipment operation: 24 economic, 21 technical and 26 organizational. The approved indicators are universal in nature and enable comparisons over time, cross-industry comparisons and benchmarking. The rules for the selection and construction of these indicators were developed based on the Maintenance Terminology standard (EN 13306) (Gumiński, 2017; Klank, 2008).

Synthetically, labour productivity indicators in a manufacturing enterprise can be calculated from the general relationship:

$$W = \frac{P}{NP} \quad (2)$$

where:

P – production level per unit of time, [products/year],

NP – workload expressed as the average level of employment per unit time, [employees/year] or as the number of man-days per unit time year [man-days/year].

The analysis of the labour productivity index can be limited to the production facility or organizational unit, as well as to a selected group of employees. What is to be noticed, the level of labour productivity is strictly connected with the workers' competencies. Technological advancement needs better-adjusted employees to new solutions implemented in an economy. The problem is that when you compare labour productivity you consider the employment level. More competitive, developmental companies, or an economy as the whole system, are the ones depending on the optimal process of all resources, including human resources. The key aspect is the adjustment of competencies to the needs of the contemporary economy.

Planning employment level and its structure in a company is an extremely important area in human resource management because this process determines the potential of the organization in both the short and long term. Planning decisions in the area of employment require taking into account many variable factors and conditions inside the company and in its environment. Effective employment planning is one of the key processes that determine the company's future development potential.

According to the definition of A. Poczowski, "employment planning is a permanent process, including the identification of personnel needs in quantitative and qualitative terms, analysing the existing state and structure of the personnel, creating plans to minimize the gap between supply and demand in the internal labour market, and monitoring the implementation of employment plans into force" (Poczowski, 2008).

The same author also emphasizes the sense of planning in a narrower sense, which "corresponds to the concept of employment planning in the strict sense and means forecasting the necessary number of employees with appropriate qualifications at a given time and place, changes in the state and structure of employment, and the reciprocal assignment of employees to individual organizational units and work stations"(Poczowski, 2008).

The subject of quantitative needs planning is therefore to determine a specific amount of work (working time) necessary to perform the adopted activities at a specific point in the future. In turn, labour supply planning means the process of determining internal labour resources that take into account changes that will occur in the future.

Internal determinants that determine the planning process are ensuring consistency between the strategy, structure, and culture of the company as well as effective human capital management (Poczowski, 2008). In turn, the factors in the external environment are determined by stakeholders and conditions of a technical, economic, legal, demographic, ecological, and socio-cultural nature.

Technical conditions result from the permanent development of civilization, which can be observed in all spheres of human life. Technical innovations lead to an increase in work efficiency, and contribute to the elimination of burdensome, dangerous and inadequate work conditions, to meet the humanization of work. The use of changes in technique and technology can bring benefits to an enterprise provided that employees are prepared for these changes well in advance. It is necessary to adapt employees to the effects of technical changes through

changes in professional qualifications and employee behaviour in the work process, as well as through modernization or liquidation of specific jobs. In enterprises, a new type of employee is shaped, whose dominant feature is a high level of knowledge and the ability to adapt to the changes taking place.

Economic conditions are related to the economic system existing in a given country, and above all, the economic situation and the situation in the labour market. These factors determine the system in which a given enterprise operates. An important aspect is the company's competitive position, financial situation and social potential. Depending on the financial situation, the enterprise may allocate greater or lesser financial resources to expenses related to human resources management. Less financial opportunities limit access to high-class specialists.

Legal conditions regulate the mutual relations between the employer and employee. The Labour Code is of particular importance (the Act of June 26, 1974, as amended). Legal changes require special attention due to the necessity to introduce changes in the employment system in the enterprise and their time-consuming nature.

Demographic conditions are related to such factors as the professional activity of the population, its number and structure, as well as internal and external migrations. Demographic conditions determine the supply of the labour market. The enterprise can obtain information on the available labour resources, their age structure and education structure.

Socio-cultural conditions determine the attitudes and behaviour of people in the work process, and in particular determine the importance of work in the local community. Depending on the value system of potential employees, the enterprise should adjust the incentive system. Each company needs employees with a diverse profile of competencies and skills. By hiring employees within a specific category, i.e. with specific professional requirements, there is a greater possibility of retraining employees to adapt them to the existing needs of the company.

4. Key employees' competencies within JZR Development Programme

The deep analysis of risk factors is of high importance in risk management (Gumiński et al., 2020). The lack of sufficient knowledge about the existing internal and external threats multiplies the negative impact on the efficiency of enterprises. This is particularly important for enterprises in the machine-building industry in a current dynamically changing economic situation.

Considering the complexity of the analysed investment project, the project team of the JZR Development Program in the initial phase of the project's implementation paid much attention to the aspects of risk management. He determined the main risk categories, identified risk factors, and then proposed actions to reduce the negative effects of existing risks. The analyses undertaken allowed us to determine the following main risk categories (Gumiński et al., 2020):

- ✓ design and construction works,
- ✓ technical and technological hazards,
- ✓ human resources,
- ✓ economic hazards.

Table 2 includes both significant standard and specific risk factors related to the implementation of the JZR Development Programme in the area of human resources.

Table 2.

The list of risk factors and actions reducing their negative impact on the JZR Development Programme in the area of human resources

No.	Risk area	Risk factor	Actions reducing risk
1	2	3	4
1.	Human resources	limited access to external specialists	cooperation with research and development centres and universities
		difficulties in acquiring new qualified employees with strictly defined competencies	multi-stage recruitment of employees, changes in a motivation system
		insufficient level of technical and economic competencies of JZR employees	training and professional development of employees
		increased needs for employees handling contracts for the supply of products to JSW coalmines	recruitment of new employees with specific technical and economic competencies, changes in a motivation system
		changes in legal conditions for JZR activity, especially the legal regulations concerning HRM	monitoring of changes and analysing legal effects on JZR activities
		retirement of skilled old workers	acceptance of the risk
		the increasing scale of departure of qualified employees	financial higher remuneration
		recruitment procedures and processes	upgrading the whole process of recruitment

Source: own preparation.

Actions reducing risks given in the Table 2 are of key importance for ensuring the success of the JZR Development Programme.

Table 3.
Staffing needs in the project (for 4 products)

Id.	Products	Total employment (persons / shifts)	Miller (CNC)	Operators (CNC)	Welder MIG/MAG	Welding machine operator	Technological line operator	Welder, locksmith (tacking)	Technical supervisor	Total number of employees
1	Elements of longwall routes of scraper conveyors	7 / 1	1		1	1	1+1	1	1	7
2	Elements of main pressure and discharge pipelines	6 / 1		1+1		1	1+1		1	6
3	Rails of suspended monorails	5 / 2	1		1		1	1	1	10
4	Rollers for belt conveyors	7 / 2		2		1	3		1	14

Source: own preparation (on materials of the JZR Development Programme).

Risks in the JZR Development program in the area of human resource management:

- ✓ limited access to external specialists,
- ✓ difficulties in employing new qualified employees with strictly defined competencies,
- ✓ insufficient level of technical and economic competencies of JZR employees,
- ✓ the increasing scale of departure of qualified employees,
- ✓ growing needs for employees performing contracts for the supply of products to JSW's coal mines.

Within the analysis of competencies requirements of employees the following ones were:

- experience in the construction of scraper conveyors, their types and individual elements,
- experience in the construction of belt conveyors, their types and individual elements,
- design and technological competencies for the modernization of powered supports,
- knowledge of techniques, technologies, and solutions in the field of welding and machining,
- skills in using specialized software in the field of machine construction in terms of technology and design,
- teamwork skills,
- knowledge of project management methods and tools.

Expectations on the part of JZR Ltd. about the competencies of employees are determined by the activity profile of this production and service company. The need to increase the engineering and technical staff as well as production workers poses a great challenge for the recruitment process due to the existing shortage of specialists in the labour market.

A sure solution for JZR Ltd. would be the active participation of the enterprise in creating the profile of a graduate at a university. This would enable establishing cooperation with a potential candidate for work in this enterprise.

5. Conclusions

The undertaken studies for analysing employees' competencies needed for the activities within the JZR Development Programme result in the following conclusions:

1. The JZR Development Programme is a key investment project within JSW Capital Group. The project makes JZR Ltd. an internal supplier of the most needed components and equipment in manufacturing processes executed within JSW Group, mainly in JSW's coal mines. The key effect of the insourcing process is the reduction of the economic risk for JSW's activity.
2. JZR Development Programme needs over 250 new employees to recruit with high technical and soft competencies. The analysed investment programme requires workers specializing in the construction and designing of scraper conveyors, belt conveyors and powered supports. Soft skills such as teamwork skills or knowledge of project management methods and tools are highly needed as well.
3. The activity of JZR Ltd. needs specialized software in the field of machine construction in terms of technology and design. These requirements are strictly connected with IT skills which should be developed within the education process. JZR Ltd. needs to participate actively in creating the profile of a graduate at a university. This could be achieved by cooperation with a potential candidate for work in this company.

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