Employee Turnover in a Construction Company: Identifying Risks and Assessing Threat Levels

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Abstract

The article addresses the issue of employee turnover risk in a construction company operating in the railway sector. The main objective of the study was to estimate the level of turnover risk and to propose a method for its assessment. The analysis was based on data collected over a three-year period from a medium-sized construction enterprise located in Poland. Turnover was defined as the number of resignations among production staff, excluding new hires resulting from business growth. Turnover risk was estimated as a function of two parameters: the probability of employee departure and the cost of hiring a replacement. These values were calculated for each year and used to construct a risk matrix. The key factors contributing to turnover included work-related stress, professional burnout, and a delegation-based work system. It was emphasized that workforce fluctuations can significantly affect the efficiency of investment project implementation..

Keywords

Risk Assessment, Workers Turnover, Construction Company, Construction Projects

1. Introduction

One of the fundamental assumptions of construction project schedules is their effective implementation and strict adherence during the execution phase [1]. In large infrastructure projects, schedule overruns may result from the experience level of subcontractors, the approach to developing internal work timetables, or the availability of qualified engineering staff [2]. Productivity rates for both machinery and human resources are usually based on theoretical operational capacities, complemented by contractors' own experience. These estimations take into account a variety of factors, including equipment failure rates, the type of works performed, as well as the professional practice and skills of the workforce [3]. While mechanical failures are relatively predictable and can be repaired, securing qualified technical staff has become a considerable challenge, potentially leading to serious disruptions in the operation of construction companies [4].

The modernization programs of railway lines currently being implemented in Poland have reached an advanced stage [5]. The accumulation of works, job-related stress, and the specific nature of railway construction—demanding significant physical effort and continuous concentration from the staff—may, over time, contribute to professional burnout and, consequently, job changes. Another factor influencing employee turnover is the delegation-based work system, which creates a significant burden not only for technical staff but also for their families [6]. Although it is difficult to fully identify all motivations behind this phenomenon, ensuring the continuity of construction services is crucial both for the functioning of construction companies and for the success of railway modernization programs in Poland. This requires proper recognition of multiple risks, including the risk of employee turnover.

The article presents a proposal for estimating and assessing turnover risk in a construction company operating in the railway sector.

2. Identification and Assessment of Employee Turnover Risk for a Selected Construction Company: Case Study

2.1 Risk Definition

In the literature, there are several definitions of risk, among which, due to the nature of the phenomenon examined in this article, the following is worth quoting: risk is a situation in which random events may occur with a known probability, resulting in specific consequences [7, 8].
Regardless of the adopted definition, risk should be associated with two parameters: the probability of a certain hazard (event) occurring and its consequences (effects).

For the purposes of this article, it was decided to include the additional financial expenditure related to hiring replacement employees for those who had left. The analysis was based on data covering three full years of the company's operations. The employee turnover risk was determined with respect to so-called "production employees," which include: site managers, engineers, foremen, team leaders, track masters, track installation workers, drivers, and machine operators.
To estimate the risk, a mathematical function combining the probability of employee turnover with its consequence – expressed as the cost of hiring a new employee – was applied [9]. The risk function is presented in Equation 1.

$$R_r = f(P, C) \tag{1}$$

where:
Rr – employee turnover risk;
P – probability of employee turnover;
C – cost associated with hiring a new employee.

2.2 Profile of the Construction Company Risk Definition

For the risk analysis, a construction company providing specialist services related to railway line construction was selected. The core business activity of the company involves the execution of construction, modernization, revitalization, repair, and maintenance works in the field of rail infrastructure across Poland. As of January 1, 2022, the company employed over 65 people, and its annual net turnover did not exceed the equivalent of EUR 50 million, which classifies the enterprise as a medium-sized company under the applicable legal regulations [10].

2.3 Identification of Employee Turnover Risk Components: Probability and Cost

The probability of employee turnover (*P*) was estimated based on the ratio of dismissals and hirings to the total number of "production employees" within the analyzed period of 12 full months. It was assumed that the company maintained a relatively stable monthly workforce size during this time and that production demands remained constant. Using company data, the number of dismissals and hirings was identified, as well as the total number of production employees employed in the given year.

In this study, employee turnover was defined solely as those dismissals and hirings that involved replacing missing technical staff. During the three-year period under analysis (2018–2020), the company systematically expanded its operations by securing an increasing number of contracts, which led to a gradual increase in the overall workforce. Therefore, new hires resulting from company growth—i.e., those related to staff expansion—were excluded from the turnover rate. Consequently, the number of turnover cases was considered equal to the number of dismissals during the analyzed period. A summary of the information on employee turnover probability is presented in Table 1.

Table 1. Employee Turnover Probability – Data Collected from the Company

	Company's Operating Period Results		
Risk factor	1.01.2018–31.12.2018	1.01.2019–31.12.2019	1.01.2020–31.12.2020
Number of dismissals	16	33	47
Average monthly number of employees	25	50	66
Employee turnover probability – *P* [%]	64.00	66.00	71.21

Estimation of the costs associated with hiring a new employee may depend on various factors, such as work experience, qualifications, type of contract, or the nature of assigned responsibilities [11]. There is also a group of additional benefits stipulated in employment contracts, for example, an allowance for work under special conditions (e.g., activities performed within the area of operational railway tracks).

In this study, it was assumed that "production employees" were employed exclusively under standard employment contracts without any additional conditions. Under such arrangements, the employer is obliged to cover the costs of mandatory medical examinations, personal protective equipment required on construction sites, and other essential benefits. These expenses are incurred by the company each time a new employee is hired, are non-refundable in nature, and should therefore be incorporated into the company's budget.
The calculations do not include fixed costs that are independent of the employee's tenure, such as travel allowances or per diem expenses. In order to estimate the additional financial burden resulting from employee turnover, the average cost of hiring a new employee was determined separately for each of the analyzed periods. The differences in costs result from fluctuations in the average market prices of services and benefits borne by the employer. The gross cost associated with employing a single new worker in the analyzed company, across the respective operational periods, is presented in Table 2.

Table 2. Cost of Hiring an Employee – Data Collected from the Company

	Company's Operating Period		
Risk Component	1.01.2018–31.12.2018	1.01.2019–31.12.2019	1.01.2020–31.12.2020
Medical examinations (average)	375 PLN	415 PLN	475 PLN
Personal Protective Equipment (PPE)	455 PLN	472 PLN	498 PLN
Occupational Health and Safety training (OHS training)	50 PLN	60 PLN	80 PLN
Cost of hiring a new employee	880 PLN	947 PLN	1 053 PLN

2.3 Assessment of Risk

For the risk assessment, a risk matrix was applied, comprising five value ranges for both parameter *P* (probability of employee turnover) and parameter *C* (cost associated with hiring a new employee). Parameter *P* was defined as probability ranges of events, while parameter *C* was expressed as a percentage of the average monthly gross salary in the given calendar year. These ranges were summarized in tabular form and are presented in Table 3. The quantified costs of hiring an employee in subsequent years are shown in Table 4.

Table 3. Determination of Value Ranges for Parameters *P* and *C*

Probability – *P*		Cost of Hiring an Employee – *C*	
Rare	0% – 20%	Very Low	0% – 20%
Unlikely	20% – 40%	Low	20% – 40%
Possible	40% – 60%	Medium	40% – 60%
Likely	60% – 80%	High	60% – 80%
Almost Certain	80% – 100%	Very High	80% – 100%

Table 4. Quantification of Cost Ranges for Employee Hiring in the Analyzed Periods

Employee Hiring Cost – *C*	2018	2019	2020
0% – 20%	0 PLN – 1033.60 PLN	0 PLN – 1082.29 PLN	0 PLN – 1131.46 PLN
20% – 40%	1033.61 PLN – 2067.19 PLN	1082.30 PLN – 2164.58 PLN	1131.47 PLN – 2262.92 PLN
40% – 60%	2067.20 PLN – 3100.79 PLN	2164.59 PLN – 3246.87 PLN	2262.93 PLN – 3394.38 PLN
60% – 80%	3100.80 PLN – 4134.38 PLN	3246.88 PLN – 4329.16 PLN	3394.39 PLN – 4525.84 PLN
80% – 100%	4134.39 PLN – 5167.98 PLN	4329.17 PLN – 5411.45 PLN	4525.85 PLN – 5657.30 PLN

After defining the matrix components, the process of its development was initiated. One of the commonly used matrix frameworks was applied, which incorporates four reference levels of risk [7].
The structure of the risk matrix is presented in Table 5, while the description of the reference risk levels is provided in Table 6.

Table 5. Risk Matrix

		Cost of Hiring an Employee				
		Very Low	Low	Medium	High	Very High
Probability	Rare					
	Unlikely					
	Possible					
	Likely					
	Almost Certain					

Table 6. Risk Levels Description

Risk Levels	Action Description
Low	Acceptable risk level – no action required
Medium	Unacceptable risk level – requires periodic monitoring, action may be deferred
High	Unacceptable risk level – requires continuous monitoring, action may be deferred
Very High	Intolerable risk level – urgent action required

3. Results

Based on the defined reference levels of parameters *P* and *C*, the individual components of employee turnover risk were determined. The obtained results are summarized in Table 7.

Table 7. Employee Turnover Risk Levels for the Analyzed Company

	Company's Operating Period		
Risk factor	1.01.2018–31.12.2018	1.01.2019–31.12.2019	1.01.2020–31.12.2020
Employee Turnover Probability	64.00%	66.00%	71.21%
	Likely	Likely	Likely
Cost of Hiring an Employee	17.03%	17.50%	18.61%
	Very Low	Very Low	Very Low
Employee Turnover Risk Level	Medium	Medium	Medium

The data presented in Table 7 clearly indicate a high probability of employee turnover within the analyzed construction company. In each of the three examined years, the probability exceeded 60%, reaching more than 71% in 2020. Such a high rate of workforce fluctuation confirms that employee turnover should be regarded as a persistent issue rather than an incidental occurrence. Moreover, an upward trend can be observed – turnover probability increased year by year, which may reflect the growing impact of factors contributing to staff departures, such as physical and mental fatigue, delegation-based work, or stress related to the specific nature of railway construction.

Based on the adopted criteria for assessing employee turnover risk, it can be concluded that in all three analyzed periods the risk level was classified as medium. Despite the high probability of dismissals and new hires (ranging from 64.00% to 71.21%), the cost of hiring a new employee remained low compared to the average monthly gross salary in Poland (from 17.03% to 18.61%). According to the established criteria, this risk requires periodic monitoring, while potential mitigation measures may be deferred.

4. Discussion

The conducted analysis confirmed that the probability of employee turnover in the examined construction company is relatively high, exceeding 60% on an annual basis. This result is consistent with broader observations in the construction sector, where frequent staff turnover is associated with demanding working conditions, long-term delegations, and significant physical and mental strain [6].

Despite the high rate of staff fluctuation, the overall risk level was classified as medium. This is due to the fact that the unit cost of hiring a new employee remained low compared to the average monthly gross salary in Poland. It should be noted, however, that the study considered only direct and easily quantifiable costs—such as medical examinations, occupational health and safety training, and protective equipment—while indirect costs, such as reduced team efficiency, loss of know-how, or the risk of project delays, were excluded [1,3,4]. The literature emphasizes that these hidden costs may have an even greater impact on the financial condition of companies than direct expenditures.

5. Conclusions

Employee turnover constitutes an important challenge for construction companies, particularly those operating in the railway sector, where demanding working conditions, long-term delegations, and continuous workload create unfavorable circumstances for staff retention. The conducted case study confirmed that this risk should be treated as a permanent element of business activity that requires systematic monitoring and preventive planning.

The proposed approach, combining probability estimates with cost quantification and applying a risk matrix, provides a practical tool for assessing the financial implications of workforce fluctuation. Beyond its financial dimension, the analysis also indicates the necessity of adopting long-term human resource management strategies aimed at improving working conditions, supporting employee retention, and strengthening organizational stability.

The presented findings may therefore support both practitioners and researchers in the development of methods for risk identification and mitigation in the construction sector. The methodology can be adapted to different organizational contexts and used as a decision-making support tool for project managers and company executives.

In conclusion, it should be emphasized that the presented results are limited to a single medium-sized enterprise and a narrowly defined cost structure. Future research should extend the analysis to a larger number of companies, different categories of employees, and the indirect costs associated with turnover. Such an approach would provide a more comprehensive understanding of the risk and its implications for the entire construction sector.

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