



Comparative Analysis between Rail and Shipping Transport from the Perspective of Adapting Human Resources to Current Economic and Social Requirements

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Abstract. The paper presents an extensive and comparative analysis of human potential in rail and maritime transport, including comprehensive statistical indicators, tables, conceptual figures, and a rigorous academic structure. The analysis uses data from 2022 to 2024 for the rail sector (CFR Constanța Branch) and specialized literature for the shipping sector, supplemented with statistical indicators specific to the port and maritime sector. The results highlight significant structural and demographic differences between the two sectors, as well as a number of common challenges: accelerated digitization, a shortage of young labor, and international pressure on professional qualifications. The results of the analyses on human potential management led to the conclusion that, in the near future, employee performance management will develop progressively, and performance-based compensation mechanisms will be of strategic importance. Based on these findings, the company's organizational structure will be reshaped to better align rail transport needs with available resources.

Keywords: human resources; rail transport; shipping; comparative analysis; statistical indicators; organizational demography; productivity.

1. Introduction

The importance of human resources in the transport sector is determined by the complexity of operations, dependence on safety, and rapid technological changes. In rail transport, issues such as an aging workforce, a mismatch between skills and the complexity of the work, and a lack of young staff are affecting adaptability. In the maritime sector, high mobility and the pressure of international certification requirements result in a different demographic structure, with a predominantly young and highly skilled workforce.

In human resource management, diagnosing the human resource department is a technique for evaluating the information gathered, as it provides an overview of the strengths expressed through advantages or assets and, at the same time, the weaknesses expressed through dysfunctions, deficiencies, or anomalies.

The compensation scheme and financial results, which are closely linked to each manager's personal profile, form the basis for employee performance reviews, becoming the key indicator for the further development of human resources within the company.



Ensuring the necessary human resources is one of the important issues facing any organization, and the way in which this activity is carried out greatly influences future results.

Monitoring changes in staff numbers and structure, retraining from certain professions that are becoming redundant to others where the training process is longer, as well as monitoring retirement prospects, are the main aspects that contribute to the implementation of a relevant personnel policy which, at the level of the Human Resources Department of the CFR Constanța Branch, we consider to be insufficiently harmonized with the current changes in the structure and quality of human resources.

Human resources have become a strategic factor of production and, at the same time, the main component of performance in all areas and at all levels of organization. This evolution allows us to appreciate that human potential is an area of utmost importance for organizational management, both in terms of efficient use and quantitative, structural, and qualitative assurance.

Human potential is defined as the sum of qualities, traits, knowledge, and experience necessary for an employee to successfully cope with the specific demands of the job [1]. Given this definition, we consider human potential to be the resource attracted and used in a company's activity, through which its competitiveness and efficiency are developed.

From the point of view of human resource diagnosis for the purpose of evaluation, management theory provides for the use of two categories of indicators: those for ensuring human potential and those for utilizing human potential [2]. This diagnosis aimed to understand human resources in terms of their evolution, structure, quality, efficiency of use, and analysis of reward management indicators.

Synthesizing the results regarding the activities of ensuring and utilizing human potential within the CFR Constanța Branch allowed, through SWOT analysis, to obtain a description of the information collected, which made it possible to structure perceptions regarding the situation of achieving the set objectives.

The SWOT method is a technique for investigating and analyzing the state of affairs at a given moment, based on the systematic study of four categories of contextual elements: strengths, weaknesses, opportunities, and threats [3]. The strengths and weaknesses resulted from the analysis of the organizational environment of the regional center, and the opportunities and threats from the comparative analysis of the surrounding environment, represented by the national company and the sector of activity.

2. Materials and methods

The methodology includes analysis of empirical data from the railway sector for the period 2022–2024, interviews with CFR unit managers, operational data, and demographic structures. For the maritime sector, the analysis is based on international literature, CERONAV documents, IMO/STCW standards, and reports on the port workforce. Indicators such as turnover rate, replacement rate, demographic dependency index, analysis of age and qualification structure, Km–Kl analysis, labor productivity, and SWOT analysis were used.

In order to diagnose human resources within the CFR Constanța Branch, the following main steps were taken: gathering qualitative and quantitative information on the practices and procedures for securing, using, and rewarding railway personnel in the branch under analysis; evaluating and structuring the information gathered in the first stage; selection of the system of indicators and their calculation; analysis of the results in order to identify strengths and weaknesses, the need for corrective action, and opportunities for improvement; planning of actions to correct deficiencies and develop proposals to increase the efficiency and effectiveness of human resource management and utilization.

The integrated model of the research process regarding human resources management and utilization within the CFR Constanța Branch is presented in the logical diagram in Figure 1.

The system of indicators used in the analysis of human potential at the CFR Constanța Branch is presented in Figure 2. The diagnosis of human resources based on the analysis of this system of indicators allowed the strengths and weaknesses to be highlighted in a SWOT analysis and provided the branch management with a benchmark for quantitative and qualitative human resources planning.

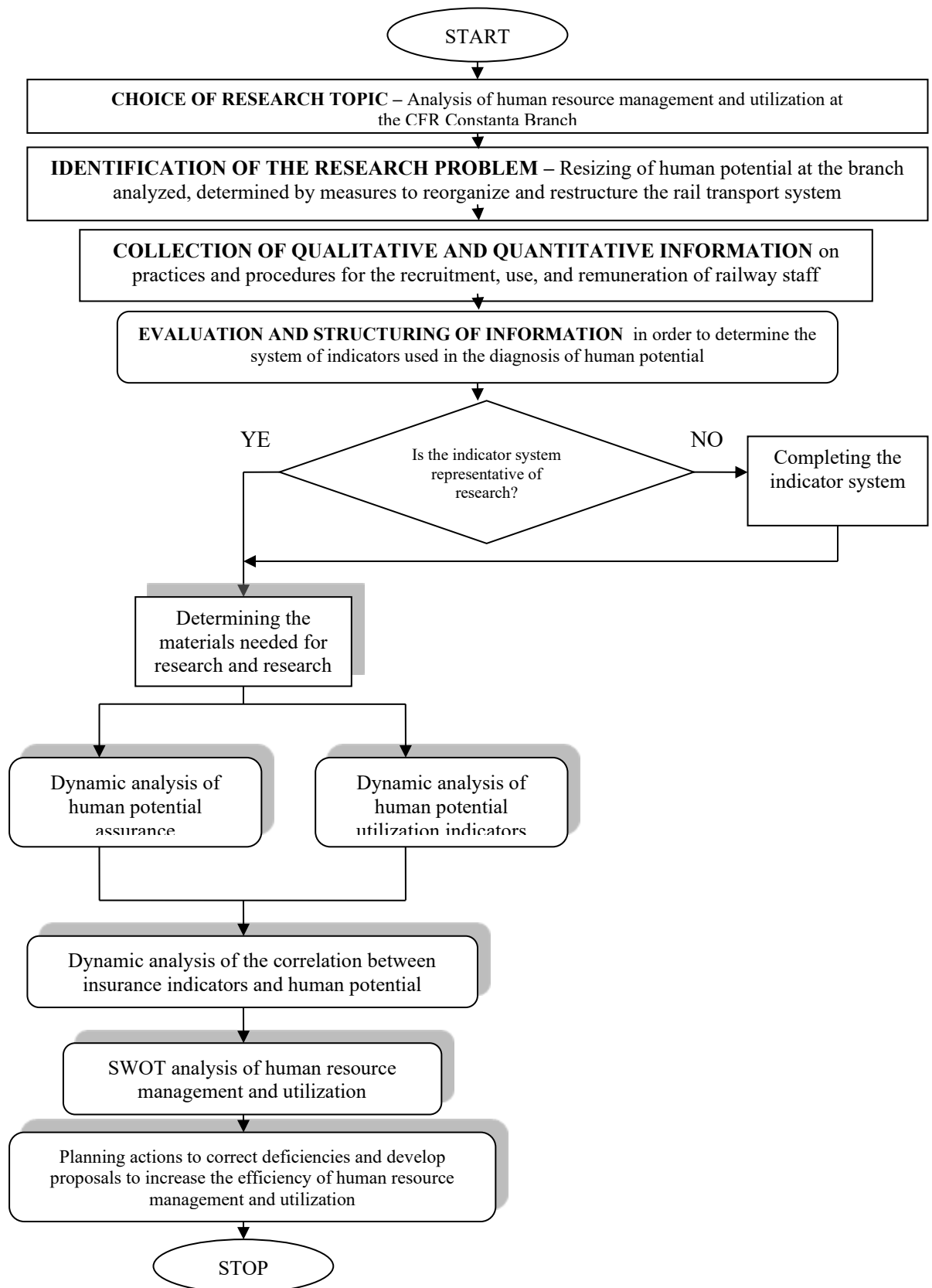


Figure 1 Logical diagram for analyzing human potential at the CFR Constanța Branch

The data and information sources required for the analyses were provided by the personnel records of the Human Resources Department, the Technical Organization and Development Department, and the Financial-Accounting Department of the CFR Constanța Branch for the period January 2022–December 2024, structured according to the requirements. For records not structured in this way, the information needed for the analyses was obtained after prior processing of the personnel data.

The human resources diagnosis was supplemented by data obtained from the processing of the questionnaire analyzing labor relations and the social climate applied to railway personnel in 2024, as well as by information provided by the managers of the relevant departments during interviews with them. Direct and indirect observation, photographing the working day, and analyzing the personnel records databases of the CFR Constanța Branch were also used as data collection tools.

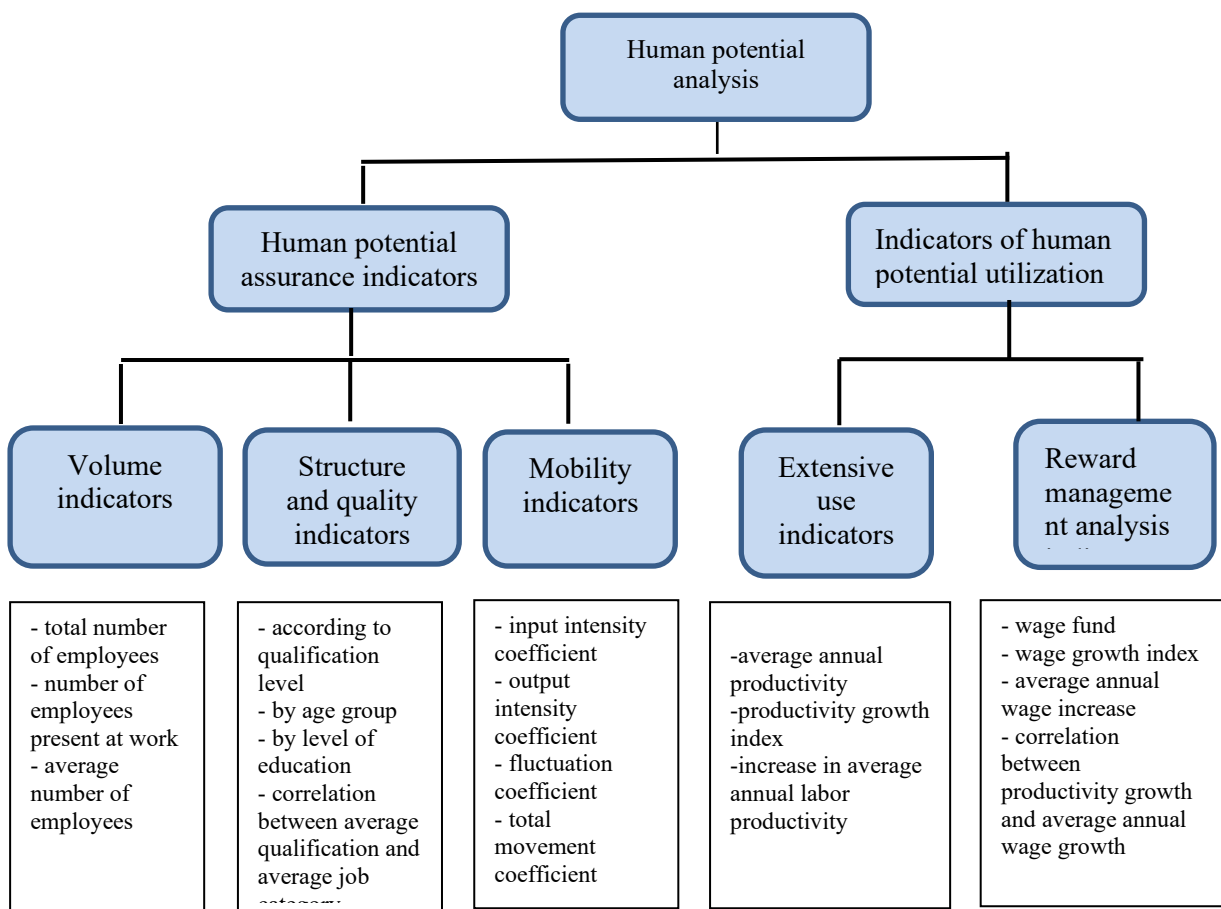


Figure 2. System of indicators used in human potential analysis, Source: Radu, P.,2004, p.155

3. Results and discussions

According to the analysis scheme in Figure 2, the assessment of the size of human resources within the CFR Constanța Branch covered three main aspects: analysis of the workforce, analysis of the human resources structure, and analysis of their mobility.

In order to properly carry out the activities of railway infrastructure management and train traffic organisation, under the conditions of the application of the new restructuring and reorganisation measures, the management of the CFR Constanța Branch must ensure the necessary human resources, both in terms of quantity and quality.



This means, on the one hand, ensuring the total number of human resources and the number of staff in each category and, on the other hand, a level of training and professional specialization in line with the specific nature of the work carried out.

The quantitative reflection of human potential at branch level was expressed using two indicators: the number of employees present at work, which expresses the number of employees present at their posts at a given moment, regardless of the size or duration of actual working time, and the average number of employees, calculated monthly, as a simple arithmetic mean resulting from the sum of the daily headcounts for that month, including weekly rest days, public holidays, and other days when, according to legal provisions, no work is performed, divided by the total number of calendar days. The average annual number of employees was determined as the simple arithmetic mean of the average monthly numbers in each of the three periods analyzed.

The daily workforce did not include employees on unpaid leave, those whose individual employment contracts had been suspended, or those seconded to work abroad, who made up the total workforce of the branch. In accordance with the provisions of Order 590/2008 issued by the Romanian Government, in calculating the average number of employees, the workforce on the previous working day was taken into account for each weekly rest day or public holiday, with the exception of persons whose individual employment contract had expired on that day. Employees who were not employed full-time were included in the calculation of the average number of staff in proportion to the working time specified in the individual employment contract. The dynamics of the total and category-specific workforce aims to highlight the technical and economic potential related to this production factor, in relation to the achievements of the previous period. To analyze the dynamics of the workforce of the CFR Constanța Branch in the period 2022-2024, we used the data in Table 1.

In 2023, compared to 2022, there was a decrease in the total number of staff by 4.9%, or 103 people, of which 86 were workers and the rest were specialist and administrative staff, along with a decrease in the volume of activity represented by an 8.6% decrease in the train-kilometer indicator, and a 9.95% decrease in revenues from railway infrastructure usage fees.

The decline in rail transport services is greater than the decrease in staff numbers, which has also affected productivity levels. The decline in activity in 2023 was mainly due to the downturn in the national economy and the financial crisis, which reduced the volume of goods produced and transported by rail operators. The CFR Constanța branch shows a steady decline in staff numbers between 2022 and 2024, accompanied by an increase in the volume of activity.

The age structure indicates accelerated aging, with over 48% of staff in the 40–49 age group and only 4–5% under the age of 30. This generates a demographic dependency ratio of over 3. The analysis of qualifications shows a Km–Kl ratio of 5.1/4.93, indicating that a significant segment of the workforce is overqualified.

Table 1 Analysis of employee dynamics at the CFR Constanța Branch

STAFF CATEGORIES	2022		2023		2024		2023/2022		2024/2023	
	NR.	%	NR.	%	NR.	%	NR.	%	NR.	%
WORKERS	1649	78,3	1563	78	1477	77,9	-86	94,7	-86	94,5
A. Skilled workers by category	146	6,9	143	7,1	132	6,9	-3	97,9	-11	92,3
B. Workers in mining operations	1462	69,4	1381	68,9	1307	69	-81	94,4	-74	94,6



C. General service workers	41	0,04	39	1,9	38	2	-2	95,1	-1	0,06
Specialized and administrative staff	456	21,6	439	22	418	22,1	-17	96,2	-21	95,2
A. Operational staff	262	12,4	258	12,8	235	12,4	-4	98,4	-23	91
B. Management staff	194	9,3	181	9,2	183	9,7	-13	93,2	2	101,1
Total personnel	2105	100	2002	100	1895	100	-103	95,1	-107	94,6
Average number of staff	2027	x	1910	x	1834	x	-117	94,2	-76	96
Train - kilometer	5.172 .151	x	4.727 .973	x	5.641 .275	x	- 444.178	91,4	913.302	119,3
Revenue from TUI [ron]	58.220.234	x	52.427.327	x	63.946.850	x	- 5.792.907	90,05	11.519.523	122

Source: Personnel records of the Human Resources Department and activity volume records of the Traffic Division

In terms of staff structure, there were no major differences between the two years, with manual workers accounting for 78% of the branch's total staff, and specialized and administrative staff 22%, but within the latter category, the 1.6% decrease in operational staff is smaller than that of management staff, which decreased by 6.8%, indicating a restructuring of the workforce with an increase in the proportion of management staff.

In 2024, compared to the previous year, there was an increase in the volume of activity carried out, as evidenced by both the 19.3% increase in the train-kilometer indicator and the 22% increase in revenue from the railway infrastructure usage fee. The regional reorganization measures taken by the company in 2024 resulted in a 5.4% decrease in the total number of staff, or 107 people, from 2,002 to 1,895 employees, reflecting a certain improvement in labor productivity. However, there was an unfavorable evolution in the staff structure due to a 5.5% decrease in the proportion of blue-collar workers, especially those involved in operations, coupled with a 1.1% increase in management staff. Another negative aspect is that the continuous decline in operating staff during the period under review affects the safety of rail traffic and the security of goods and passengers transported by rail.

The average number of employees indicator recorded a continuous decrease of 9.6% during the same period, from 2,027 employees in 2022 to 1,834 employees in 2024, with this trend continuing in 2025.

The evolution of the average number of staff compared to the evolution of the volume indicators of the services provided by the CFR Constanța Branch is presented in Figure 3.

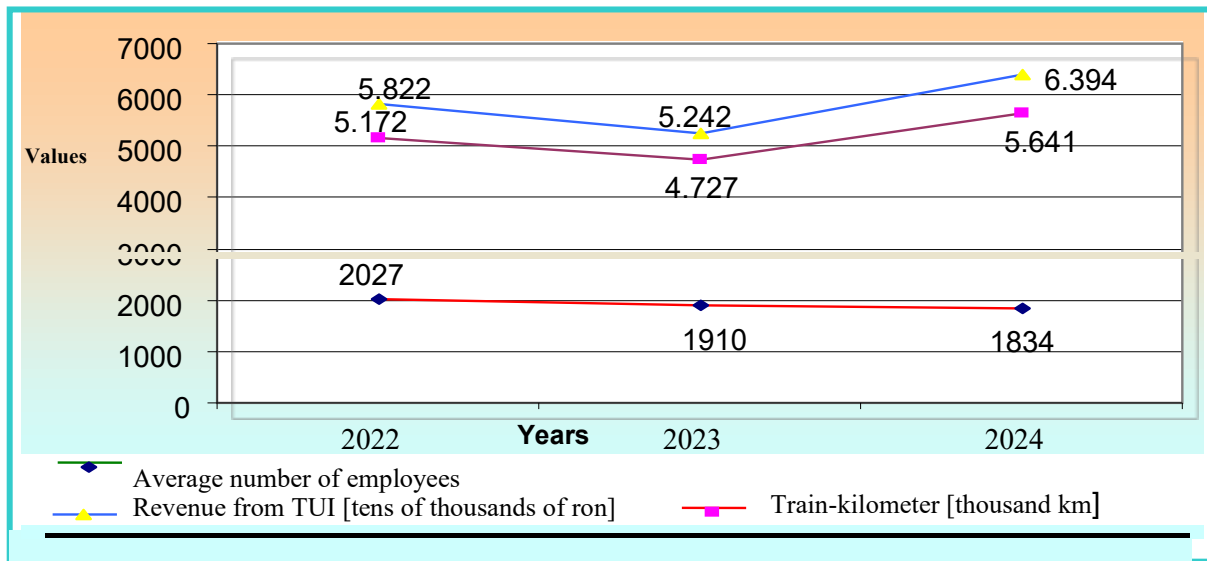


Figure 1 Comparative evolution of average staff numbers with activity volume indicators
 Source: The personnel records of the Human Resources Department and the activity volume records of the Traffic Division

The quantitative structural aspect of human potential is complemented by the qualitative aspect, expressed in work performance as a factor of production [8]. This second aspect is particularly important because the scale of production and the evolution of productivity depend directly on the level of workforce skills.

The qualitative analysis of human resources at the CFR Constanța Branch aimed to highlight the following aspects, which are essential for the formulation of future personnel strategies and policies: the structure of the workforce in terms of qualification and training; assessment of the level of qualification of workers; analysis of the correlation between the level of qualification of workers and the degree of complexity of the work performed [9].

The analysis of the workforce structure by type of qualification and training was carried out by grouping staff statistically according to their training and length of service, followed by calculating their share in the total number of staff or in a specific segment thereof. Table 2 shows the distribution of railway personnel within the CFR Constanța Branch, according to their educational background and sector of activity.

Table 2 Staff structure by educational background

Years	2023						2024					
	Total		Technical and economic staff		Exploitation		Total		Technical and economic staff		Exploitation	
	no	%	no	%	no	%	no	%	no	%	no	%
Higher education	213	11	79	37,09	134	62,91	222	11,7	79	35,59	143	64,41
College	33	1,6	14	42,42	19	57,58	30	1,58	11	36,67	19	63,33
High school	1015	51	130	12,81	885	87,19	995	52,5	110	11,06	885	88,94



Vocational school	382	19	61	15,97	321	84,03	342	18	55	16,08	287	83,92
Elementary school	359	18	39	10,86	320	89,14	306	16,1	33	10,78	273	89,22
Total employees	2002	100	323	16,13	1679	83,87	189 5	100	288	15,2	1607	84,8

Achieving an appropriate level of human potential, by increasing the number of people with advanced studies and employing them in appropriate positions, is a determining factor in achieving the best possible correlation between increasing the degree of specialization of rail transport services and the growing demands of rail operators. An indicator frequently used in the literature for the evolution of the job structure in terms of staff qualifications is the indicator that tracks the evolution of staff with higher education in the total workforce, ISUP, calculated as follows [4].

$$I_{SUP} = \frac{\frac{SS_1}{ET_1}}{\frac{SS_0}{ET_0}} \times 100 = \frac{\frac{222}{1895}}{\frac{213}{2002}} \times 100 = \frac{0,112}{0,106} \times 100 = 110,3\% \quad (1)$$

in which, SS_1 = number of staff with higher education in the current year, ET_1 = total number of staff in the current year, SS_0 = number of staff with higher education in the previous year, ET_0 = total number of staff in the previous year.

According to the data in Table 2 and calculation formula (1), the I_{SUP} indicator has a value of 110.3%, which means that the share of staff with higher education in the total number of employees increased in 2024 compared to the previous year and reflects the efforts of the regional center's management to raise the quality level of the staff employed.

This is also evident for staff with secondary education, whose index, calculated using the same formula, is above unity, while for staff with general or vocational education, the index obtained is below unity, highlighting the concern to reduce the number of poorly trained or qualified staff. In 2024, the number of highly qualified personnel increased from 213 to 222, representing 11.7% of the total workforce.

This represents a favorable development, given the decrease in the total number of staff in 2024 due to the restructuring and reorganization of the railway sector, and also the basis for increased labour productivity, as the structure by sector of activity has improved, with a 1.5% increase in the proportion of senior staff in operations and a 1.6% decrease in the proportion of technical and economic staff.

Most of the staff employed at the CFR Constanța Branch have average qualifications, being graduates of technical high schools specializing in railways, while workers in specific categories or those in general service have minimal qualifications, being graduates of general education schools, representing 16.1% of the total workforce, or graduates of vocational schools, accounting for 18% of the total workforce. In 2024, the number of staff with secondary education employed in operations remained constant, but their share of the total staff with secondary education increased by 1.8%, while the share of employees in technical and economic activities decreased by 1.9%, from 130 to 110 people.

Maintaining the same number of staff with secondary education in operations also means reaching a lower limit on the number of people with executive functions in railway infrastructure operations. a decrease in this number, without an improvement in technical progress and working technologies, is likely to cause serious damage to the company by affecting the safety of rail traffic.

The analysis of structural indicators by age group or gender is of great importance for understanding how human resources are provided. In this regard, Table 3 shows the dynamics of the structure by age

group for the period 2022-2024, and Figure 4 shows the structure of the workforce by gender for the same period at the CFR Constanța Branch.

According to the data in Table 3, we note that the branch's staff is quite old, with no young people under the age of 20 having been hired since 2020.

Table 3 Evoluția structurii personalului pe grupe de vârstă

Years	2022				2023				2024			
	Total		SB	CS	Total		SB	CS	Total		SB	CS
	No.	%	No.	No.	No.	%	No.	No.	No.	%	No.	No.
< 20 years	1	0,05	1	0	0	0	0	0	0	0	0	0
20-29 years	136	6,46	123	13	105	5,24	101	4	95	5,01	91	4
30-39 years	782	37,1	706	76	642	32,1	580	62	587	31	528	59
40-49 years	862	41	784	78	922	46,1	844	78	917	48,4	840	77
50-59 years	321	15,2	268	53	326	16,3	259	67	288	15,6	228	60
> 60 years	3	0,18	0	3	7	0,31	3	4	8	0,42	5	3
total employees	2105	100	1882	223	2002	100	1787	215	1895	100	1692	203

Clarification: SB = basic territorial subunits, CS = head office

The largest share in each of the three years is held by the 40-49 age group, both in the basic subunits in the territory and in the branch headquarters, a share that increased from 41% in 2022 to 48.4% in 2024. The uniform distribution of staff in the two areas of activity is maintained for the other age groups, with the proviso that there are very few people over the age of 60, and the 30-39 age group has decreased from 37.1% to 31% as a result of layoffs in the railway system in 2023 and 2024.

Most of the staff are in the 30-50 age group, which means that there is a major imbalance in the age pyramid in the branch analyzed, with very few people close to retirement and very few young people without the necessary experience to operate the railway infrastructure.

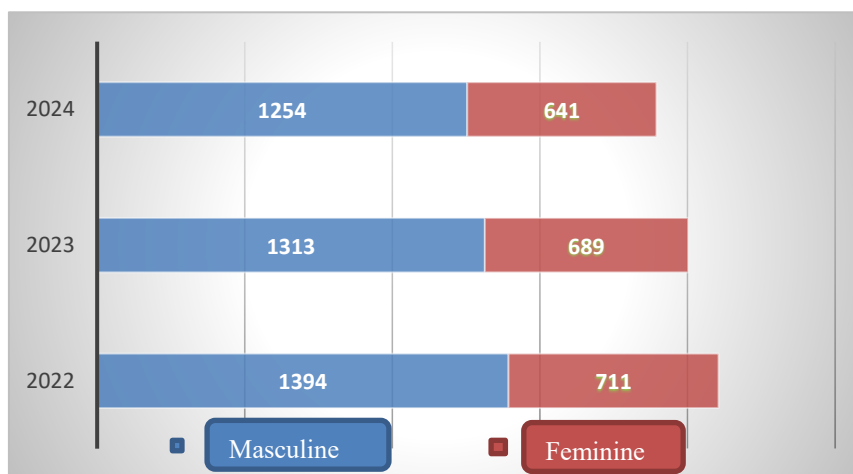


Figure 4. Gender structure of railway personnel at the CFR Constanța Branch

Women's right to work and professional equality between the sexes are respected at the CFR Constanța Branch, as the proportion of female employees has remained constant over the last three years



compared to that of male employees. The degree of specialisation of women employed in the railway transport system has increased continuously, with women holding positions in economic and administrative roles as well as technical roles, infrastructure operation and railway traffic organisation.

Since the analysis of personnel by age and education categories showed that directly productive workers have a low level of education and are relatively old, we considered it necessary and appropriate to conduct another aspect of the qualitative analysis of the workforce at the CFR Constanța Branch, which focused on the correlation between the level of qualification of the workforce by category and the degree of complexity of the work performed [5].

The indicator used to analyze the qualification of workers classified by category was the average qualification coefficient, K_m , calculated as a weighted arithmetic mean between the classification category k_i and the number of operational staff in that category N_i , as follows:

$$K_m = \frac{\sum_{i=1}^n (k_i \cdot N_i)}{\sum_{i=1}^n N_i} \quad (2)$$

In analyzing the use of operational personnel, the degree of complexity of the work performed, K_l , was also determined, calculated as a weighted arithmetic mean of the complexity category of the work k_i with the volume of work in each category V_i , as follows:

$$K_l = \frac{\sum_{i=1}^n (k_i \cdot V_i)}{\sum_{i=1}^n V_i} \quad (3)$$

The situation in 2024 is reflected in the data in Table 4, based on which the correlation between the qualification level of workers by category and the complexity of the work performed was calculated. In 2024, the average qualification coefficient had a high value, $K_m = 5.1$, and was close to the maximum value for the category, which indicates the branch management's concern for improving the quality of operational workers. During the same period, the degree of complexity of the work performed by the same personnel was slightly lower, $K_l = 4.93$.

Table 4. Distribution of workers by employment category and volume of work performed

Classification category (ki)	Distribution of workers by skill category		Distribution of work volume by category		The gap between the proportion of workers and the proportion of work performed
	Number of workers on contract	Percentage of total	Working norm	Percentage of total	
I	4	3,03	1550	5,61	-2,58
II	5	3,79	1826	6,60	-2,82
III	3	2,27	950	3,44	-1,16
IV	28	21,21	4205	14,53	6,69
V	36	27,27	7059	25,53	1,74
VI	32	24,24	8040	29,08	-4,84
VII	24	18,18	4016	14,60	3,58
TOTAL	132	100,00	27646	100,00	
Average coefficient	$K_m = 675/132 = 5,1$		$K_l = 136519/27646 = 4,93$		0,61

Source: The registers of the technical staff qualifications of the Technical Organization and Development Service, with calculations and interpretations performed by the authors.



From the comparative analysis of the two average coefficients revealed a discrepancy between the skill level of workers and the category of work they perform, a situation considered inappropriate with implications for employee remuneration costs, in the sense of increasing them.

Since, overall, the average category of work is 0.61% higher than the average category of workers, we consider it necessary to correct the large difference in the structure for some categories, such as categories IV and VI, and we propose that the remuneration of this type of worker be based on the category of work, with lower salary costs, higher quality, and high labor productivity [6].

Diagnosis is a specific management tool used to formulate recommendations that strengthen strengths or improve weaknesses. In the context of human resource management and utilization, the cause is the independent variable, while the effect is the dependent variable [7].

In order to fulfill its objectives, the Human Resources Department of the CFR Constanța Branch has the following main responsibilities:

- it centralizes proposals for modifying or supplementing the minimum training and seniority requirements necessary for hiring and promoting personnel from each sector of activity within the branch and forwards them to the Human Resources Department for analysis and approval;
- monitors the application of the provisions of the collective labor agreement regarding salary rights, the duration of vacation, study, and unpaid leave for staff in the central apparatus of the branch and its subordinate subunits;
- keeps a nominal record of staff movements and promotions for the central office of the branch and its directly subordinate subunits, as well as a numerical record by position, activity, salary level, age group, gender, eligible staff, and salary classification for all staff.

The SWOT analysis of the railway infrastructure and activities related to the use and assurance of human potential is presented in Table 5.

Table 5 SWOT analysis of securing and utilizing human potential at the CFR Constanța Branch

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> - the existence of highly qualified personnel capable of ensuring the proper implementation of the modernization measures required to ensure interoperability and intermodal transport; - qualitative filtering of railway personnel over the last two years, with favorable effects on labor productivity growth; - promotion of professional equality between genders; - the use of an objective job evaluation procedure to determine the salary level and limits for each position; - the geostrategic position ensuring connection with the seaport of Constanța for the transit of goods; - the average gross annual salary is higher than the average for the company, the sector of activity, and the national economy. 	<ul style="list-style-type: none"> - fluctuation in labor productivity indicators; - incomplete utilization of working time; - the minimum wage for the first wage category is lower than the minimum wage for the economy; - a gap between the classification of workers and the level of work performed; - massive concentration of staff in older age groups and low proportion of staff with higher education, especially in operational activities; - no methods for identifying employees with high potential for effective deployment in appropriate positions; - lack of personnel in the Human Resources department to periodically carry out strategic and tactical forecasts regarding the achievement of the regional mission in terms of ensuring the necessary human resources;



OPPORTUNITIES	THREATS
<p>- the existence of a railway network included in pan-European corridors and the implementation of a modern train traffic management system that allows for increased traffic speed and the volume of goods transported by rail;</p> <p>- the possibility of accessing non-reimbursable external funds necessary for the maintenance and modernization of the railway infrastructure, thus not affecting the wage fund;</p> <p>- the possibility for certain categories of staff to participate in exchanges of experience with staff from other branches or from European Union countries, with a view to improving their professional skills and experience;</p> <p>- annual training and certification of personnel with responsibilities in train traffic safety.</p>	<p>- the migration of qualified personnel to private rail transport operators, mainly due to the reward system;</p> <p>-insufficient correlation between labor productivity growth and wage fund growth;</p> <p>- delayed approval of the revenue and expenditure budget of CN CFR SA at values lower than those allocated, which affected the proper distribution of the funds needed by the Constanța branch and the smooth running of railway activities, leading to bottlenecks;</p> <p>- decreased interest of port economic agents in rail transport, due to the increase in the number of private road transport means and the acceleration of motorway construction;</p>

In order for the efforts made to correlate the number of staff with the level of performance to be followed by corresponding results, we consider it necessary for the human potential of the CFR Constanța Branch to be used judiciously. The professional training activities carried out to date by the Human Resources Department have focused on ensuring the necessary skilled workforce, retraining surplus staff, improving the professional training of a significant number of employees, and developing specific regulations. At the same time, we believe that the main objectives of professional training should be to adopt strategies to attract labor to sectors where there is a shortage of personnel, by: attracting candidates with specialized higher education, covering tuition fees, organizing activities to promote railway-related fields of activity among social groups that are suitable in terms of educational background, and contacting decision-makers in higher education to analyze ways of improving bilateral relations for the benefit of both parties.

In order to adapt CN CFR SA to the competitive business environment specific to the market economy, our proposals regarding the important levers to be used in the future in human resources management at the "CREIR CF" Constanța Branch are as follows:

- rejuvenating the workforce and continuing to raise its level of training, and in order to attract workers with higher education in specializations where there is a significant shortage of personnel, organizing actions to promote the facilities and prospects offered to people who become railway employees;
- it should be noted that the recruitment and hiring of personnel with higher education must be continued throughout the year, depending on workforce fluctuations, the needs resulting from periodic analyses carried out by each organisational structure and the annual central budget for personnel expenses;
- assessing the possibility of introducing a differentiated system for monitoring the performance of each employee, with a view to professional development or promotion, which would facilitate greater motivation and involvement of staff in achieving the company's objectives;
- equipping the company's own training network with computers and software that meet current requirements, as well as raising the teaching standards of the lecturers who teach the professional training courses organized by the company.

We believe that training a group of specialists within the Human Resources Department to implement an objective system for evaluating individual performance for each category of employees and to support transparency in reward practices will stimulate staff involvement in achieving the company's economic



and financial performance objectives and financial objectives of the company and increase flexibility in reward management.

The maritime sector, including port activities and shipping [11], is characterized by a high degree of professional specialization due to international standards (IMO, STCW) and highly digitized processes[12]. Naval personnel have high professional mobility, with turnover rates of 12-18% per year, significantly higher than in the railway sector. The demographic structure shows a high proportion of employees under 40 (approximately 45%), which reduces the demographic dependency ratio to values close to 1 (Table 6).

Table 6 Indicators of labor force in the naval sector

Indicator	Average value	Source	Comments
Staff turnover	12–18%/an	CERONAV (2024)	High international mobility
Percentage of total staff < 40 years	45%	IMO Workforce Survey (2023)	An attractive sector for young people
Certification level	Very high	STCW	Mandatory by regulation
Replacement rate	High	ILO (2022)	Constant intake of cadets

A comparison of the two sectors reveals significant structural differences: the rail sector has an aging workforce, low turnover, and low mobility, while the maritime sector has a young, mobile, highly skilled workforce that complies with strict international standards. At the same time, digitization requirements are more advanced in the shipping sector [16] due to the integration of ports into global logistics chains (Table 7).

Table 7 Comparative analysis between the railway sector and the shipping sector

Dimension	Railway Sector	Naval Sector	Comments
Demographic structure	Aged	Balanced, young	The naval sector attracts more young people
Mobility	Low	Very high	Migration to international companies
Certifications	Moderate	High (IMO/STCW)	The shipping industry requires international standardization
Digitization	In progress	Advanced	Smart ports

The SWOT analysis was carried out following the interpretation of the results obtained for the analyzed indicators and subsequently validated during discussions and consultations with the regional director and division heads. It consistently represents all aspects presented in the study, as well as elements of analysis of the potential of the railway infrastructure.

The remuneration of railway staff is based on categories and salary grades rather than on the complexity of the work performed, which leads to high expenditure on the remuneration of these staff, who perform work with a lower degree of complexity than their qualification in the category. The level of workforce qualification is of particular importance for the management of the branch, as it is reflected in the main indicators of economic and financial performance, especially in labor productivity, turnover, or service quality, but also for employees, who, through the rewards offered, are placed in a favorable position in an appropriate social climate.



4. Conclusions

A comparison of the two sectors shows that shipping is significantly more dynamic than rail, with a younger and more skilled workforce. Rail faces major challenges in replacing staff and adapting to digitalization. In contrast, the shipping sector faces retention issues due to international mobility. Both sectors require active human resource policies, accelerated digitalization, and continuous training programs.

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