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ATTRACTION AND TRAINING OF QUALIFIED LABOR FOR RAIL AND METRO RAIL SYSTEMS

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“The secret of change is to focus
all of your energy, not fighting
the old, but on building the new”
Dan Millman, 1980.

RESUMO

Para atender à crescente demanda por uma matriz de transportes mais balanceada, atendendo não somente o transporte de cargas, mas também o crescente desenvolvimento das cidades, os transportes ferroviário e metroviário estão recebendo maior atenção e investimentos. Para suportar a necessidade de atualização de infraestrutura, expansão de linhas e modernização de sistemas, é necessário que o país possua um contingente de profissionais qualificados a projetar, construir, manter e gerir estes sistemas. Além dos desafios já conhecidos com as linhas atuais, temos também a necessidade de profissionais aptos a trabalharem com o dinamismo e evolução de tecnologias no setor, como sistemas de controle de tráfego e eletrificação de linhas mais robustos. Em muitas partes do mundo o setor ferroviário enfrenta o desafio de uma força de trabalho envelhecida, tornando a substituição de profissionais que se aposentam uma prioridade. No Brasil a realidade se espelha e é fortalecida pela perda do histórico de classe dos ferroviários, vinculados à Rede Ferroviária Federal (RFFSA). Este estudo apresenta este histórico de risco de perda no capital intelectual ferroviário e destaca a importância de promover uma cultura organizacional inclusiva, fomentando a diversidade para o desenvolvimento e retenção de talentos. Através da coleta de dados e percepções em entrevistas com pessoas chave do setor, uma compreensão mais profunda das dinâmicas da força de trabalho no setor metroferroviário orientaram o desenvolvimento de um compilado de valiosas iniciativas para empresas que buscam uma vantagem competitiva na atração e retenção de profissionais qualificados.

Palavras-chave: Cultura organizacional inclusiva; Capital intelectual ferroviário; Formação de profissionais; Força de trabalho em envelhecimento.

ABSTRACT

To meet the growing demand for a more balanced transportation matrix, serving not only cargo transportation, but also the growing development of cities, rail and metro transportation are receiving greater attention and investment. To support the need for infrastructure upgrades, line expansion, and system modernization, it is necessary for the country to have a contingent of qualified professionals to design, build, maintain, and manage these systems. In addition to the challenges already known with the current lines, we also need professionals who are able to work with the dynamism and evolution of technologies in the sector, such as more robust traffic control systems and line electrification. In many parts of the world, the rail sector faces the challenge of an aging workforce, making the replacement of retiring professionals a priority. In Brazil, the reality is reflected and is strengthened by the loss of the historical class of railway workers, linked to the Rede Ferroviária Federal (RFFSA). This study presents this history of risk of loss in rail intellectual capital and highlights the importance of promoting an inclusive organizational culture, fostering diversity for the development and retention of talent. Through the collection of data and perceptions in interviews with key people in the sector, a deeper understanding of the dynamics of the workforce in the metrorail sector guided the development of a compilation of valuable initiatives for companies that seek a competitive advantage in attracting and retaining qualified professionals.

Keywords: Inclusive organizational culture; Railway intellectual capital; Training of professionals; Aging workforce.

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LIST OF ABBREVIATIONS

ABIFER	Brazilian Railway Industry Association
AEAMESP	Association of Metro Engineers and Architects
ANP Trilhos	National Association of Rail Passenger Carriers
ANTF	Associação Nacional dos Transportadores Ferroviários
BNDES	National Bank for Economic and Social Development
BRT	Bus rapid transit
CFP	Professional Training Centres
CNT	National Confederation of Transport
ITL	Institute of Transportation
OECD	Organization for Economic Co-operation and Development
PNE	The National Education Plan
RFFSA	Federal Railway Network
SENAI	National Service of Apprenticeship for Industry
SENAT	National Service of Apprenticeship of Transport
SEST	Social Service of Transport
TCA	Technical Cooperation Agreement
VLT	Light rail transit

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1. SETTING THE SCENE

Several factors play a decisive role in the development of countries and regions, with one of great importance being an efficient transportation system. The combination of economic globalization, trade liberalization, and technological innovations has generated a new market perspective, where competitive and comparative advantages have been shaped, increasing demands in regions with high logistical costs (CNT, 2020).

Rail transportation is a fundamental pillar for the economic and social development of a country. Its efficiency and capacity for moving goods and passengers have been acknowledged throughout history. However, it currently faces considerable challenges due to the growing demand, making it imperative to invest in infrastructure, expand lines, and modernize systems (CNT, 2020).

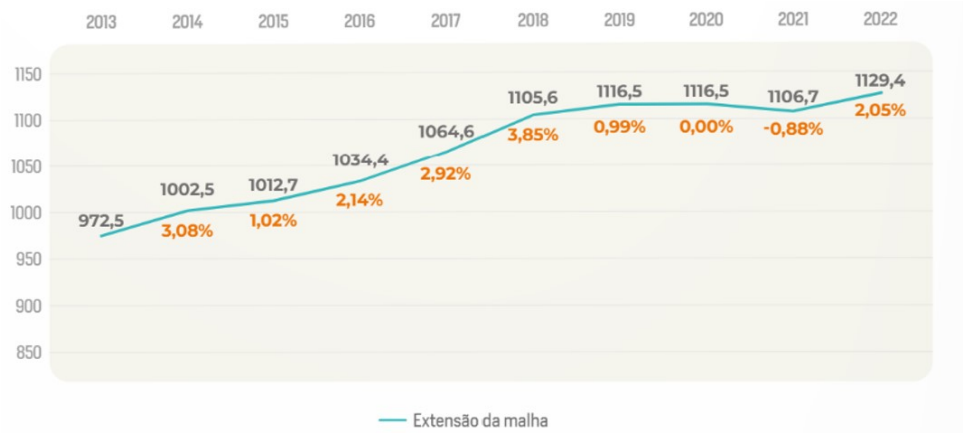
In 2023, the National Bank for Economic and Social Development (BNDES) and the Ministry of Cities signed a Technical Cooperation Agreement (TCA) to enhance the urban mobility of 21 major cities in the country. The main goal of the partnership, signed by President Aloizio Mercadante and Minister of Cities Jader Filho, was to develop a National Urban Mobility Study.

One of the main challenges faced is the obsolete infrastructure and the need for modernization. Many railway systems have old structures that require updating to meet safety standards, operational efficiency, and environmental sustainability. The introduction of advanced technologies, such as smart signaling systems, high-speed trains, and infrastructure adapted for specific loads, requires substantial investments.

The agreement envisages the development of a consolidated long-term vision, with a 30-year horizon, for investment needs in public passenger transportation systems, covering trains, subways, light rail transit (VLTs), and bus rapid transit (BRTs). Investment in railway infrastructure is not limited to the construction of new lines only. Maintaining the existing infrastructure is also crucial to ensure safety and operational efficiency. Preventive and corrective maintenance of tracks, bridges, tunnels, and stations is essential to avoid failures and ensure service continuity.

According to the reference "Trilhos" (2024) - The Sector Balance 2022, conducted by ANP Trilhos, the railway network shows growth, as indicated in Graph 1, but it is still insufficient to meet the demands of the Brazilian population regarding public transportation and the improvement of urban mobility.

Graph 1: Expansion of the metro-rail network in kilometers.



Source: Trilhos, 2024.

Despite this shortfall, the metro sector accounted for formal employment of 38,200 people in 2022, as depicted in Figure 1.

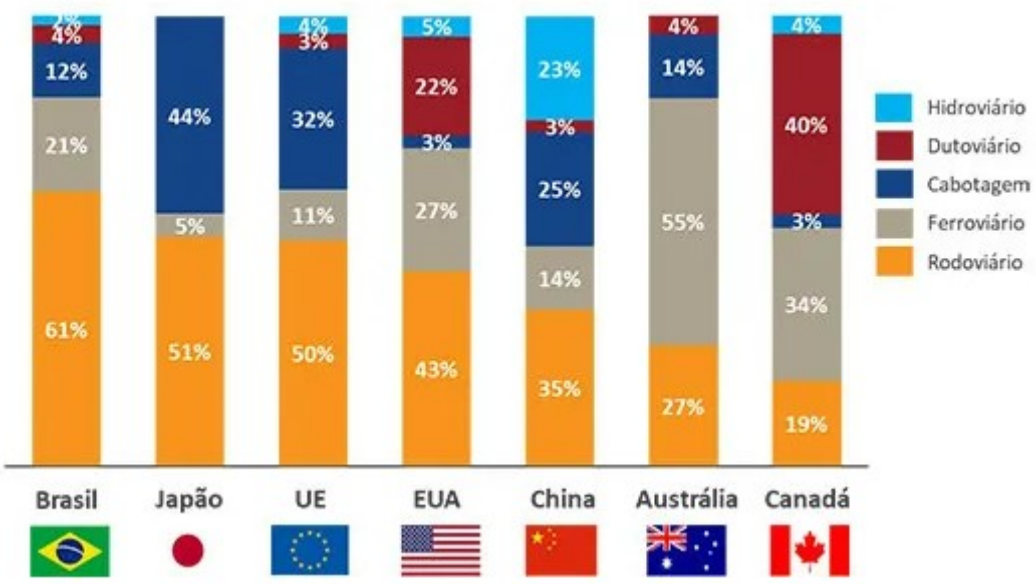
Figure 1: Evolution of employability in the metro sector.

Source: Trilhos, 2024.

In addition to the metro sector, there are also investments and challenges in railways. Brazil is known for having an imbalanced transportation matrix, where road transport has greater predominance, followed by rail transport, as shown in Graph 2. This matrix confirms both the dominance of road transport in relation to other modes,

as well as the potential for the overall expansion of rail transport (ALVARENGA, 2020).

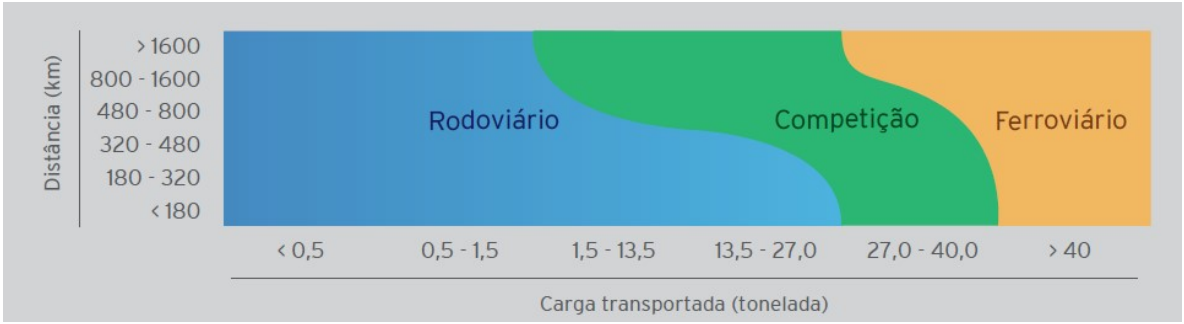
Graph 2: The Brazilian transportation matrix and its comparison to other countries' matrixes.



Source: Alvarenga, 2020.

The most notable advantage of rail transport lies in its ability to efficiently transport large volumes over long distances, in contrast to the road mode. This can be further elucidated by referring to Graph 3 below (MENEZES, 2021).

Graph 3: Comparison between road and rail modes.



Source: Menezes, 2021.

The competition zone between the two modes occurs for transportation between 27 and 40 tons, where the predominant factor for choice is the distance

traveled. For transports with higher capacity, rail transport is the most suitable, regardless of the distance covered (MENEZES, 2021).

In Brazil, a significant portion of the freight railways is century-old and simple, with various layout limitations for efficiency and speed gains. Additionally, cities have developed and grown around the railways, limiting track expansion and infrastructure improvement, also contributing to the low efficiency of the mode. In this context, railway infrastructure works and the implementation of technologies for operational safety are necessary, leading to a growing demand for specialized workforce in the sector.

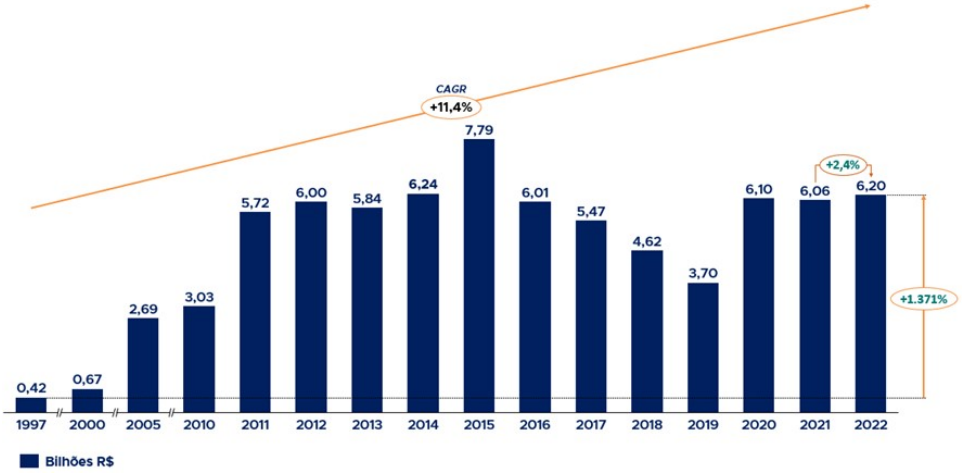
Traffic control systems represent another significant advancement in the railway industry. The implementation of intelligent systems to monitor and control train movements not only enhances safety but also optimizes operational efficiency. However, integrating these systems into existing infrastructures and ensuring their compatibility requires advanced knowledge in information technology, communication, and software engineering. Another crucial aspect is the transition from conventional traction systems to electrified systems, connected to the reduction of carbon emissions from the mode. This change involves complex challenges in electrical engineering, network infrastructure, and energy management. Qualified professionals are needed to plan and implement this transition, as well as to ensure the proper maintenance of electrified systems.

Even though we are aware that the sector undergoes development and the application of new technologies, along with the transformation of manual labor into mechanized and automated activities, the growth of companies indicates a constant increase in the workforce employed in the sector. This trend is gradually exacerbated by the need for professionals trained in specific specialties. Professionals with training and qualifications geared towards the integration of machinery and changes in the modus operandi in operations and maintenance are considered key assets within organization.

According to data from ANTF (2022), the generation of direct and indirect employment in the sector has grown by 218% since 1997, increasing from 13,506 (in that year) to 42,979 in 2022. One of the factors linked to this growth is the investments in the network granted to the private sector, as shown in Graph 4. From

1997 to 2022, railways invested approximately R$ 156 billion, mainly focused on improvements and recovery of the network, purchase and refurbishment of rolling stock, acquisition of new technologies, professional training, operational qualification, among other areas.

Graph 4: Investments in the railway granted to private initiative.



Source: ANTF, 2022.

The metro-rail sector is experiencing a high demand for the hiring and qualification of workforce, increasingly relying on highly skilled professionals in engineering and technology to drive these innovations. These professionals not only need to stay updated with technological advancements but also must possess analytical skills, problem-solving abilities, and a comprehensive understanding of railway systems. Another crucial aspect is the need for technical workforce replenishment in the sector. In freight railways, the average overall turnover rate reaches approximately 10.5%, with variations between 5% and 17% depending on the company and region.

To address the challenges of qualified labor shortages in the sector, companies have been developing and offering updated educational programs tailored to the demands of the railway market, with or without the partnership of institutes and government agencies. This initiative creates qualification opportunities for various regions and supports the workforce supply chain, aiming to ensure a qualified workforce capable of facing emerging technological challenges.

1.1. Objective

This study aims to diagnose the needs and challenges in attracting and retaining qualified workforce for the railway and metro sectors.

1.1.1. Specific objectives

This study also aims to:

- Identify best practices related to the retention and attraction of qualified workforce.
- Consolidate and share actions related to the retention and attraction of workforce.

2. THE RAILWAY AND METRO SECTOR AND ITS EMPLOYABILITY

The rail transport system in Brazil has a long history, dating back to the 1820s when the Imperial Government authorized the construction and operation of general roads to connect various regions of the country. The initial focus of this connection was to link the states of Rio de Janeiro, São Paulo, Minas Gerais, Rio Grande do Sul, and Bahia (TRANSPORTES, 2016).

Initially, the planned growth and states were not achieved due to the lack of fiscal attractiveness for necessary investments. Nevertheless, the construction of railways in Brazil continued. Even with railways that did not achieve their final goal, being partially implemented, they served as the foundation for the development of the regions they passed through. An example of this trend is the second railway inaugurated in Brazil, the Recife-São Francisco, which, despite not reaching the São Francisco River, developed cities along its route, generating commerce, employment, and attractiveness in the region (TRANSPORTES, 2016).

In 1922, Brazil already had approximately 29,000 km of railway lines, about 2,000 steam locomotives, and 30,000 wagons in operation. This mode, present in almost all regions of the country, was a fundamental vector of employment in the regions, considered stable employment that fostered the development of cities where

it was located. It was not only the construction of the railway that drove this movement, but also its maintenance and assets (TRANSPORTES, 2016).

This robust structure of railway lines with extensive geographical dispersion required active management. To this end, in 1957, the Federal Railway Network (RFFSA) was created. The management brought together 18 regional railways and aimed to promote and manage development in the railway transportation sector. The Network, as it became known, had key competencies (EVARISTO, 2023):

a) Manager, operate, preserve, re-equip, expand, improve, and keep in traffic the railways incorporated into it.

b) Issue on the market, at their nominal value, bearer bonds of their own issue or issue of companies that it organizes, up to double its subscribed capital, with or without Treasury guarantee.

c) Subscribe to the capital of companies under its control and grant them loans or guarantees.

d) Systematize and supervise the administration of the companies under its control, as well as their methods and operation processes, through a service provision contract ensuring technical, accounting, legal, and administrative assistance to these companies.

e) Propose tariff revisions and modifications deemed necessary to the “Departamento Nacional de Estradas de Ferro” (National Department of Railways), which will study the proposals, consult the relevant bodies, and submit the results for final approval by the “Ministro da Viação e Obras Públicas” (Minister of Transportation and Public Works”.

f) Develop the activity plan and approve the budgets of the companies under its control, overseeing their respective execution.

g) Restructure personnel in line with service needs and regional living standards, fixing their number in the companies it organizes, as well as their remuneration, rights, and duties.

h) Carry out all study and construction work for railways entrusted to it by the Union, or for which resources are provided.

i) Supervise, throughout the national territory, railway transportation services;

j) Promote the coordination of tariff and cost studies for railway transport in general.

l) Plan the unification and standardization of the Brazilian railway system.

m) Conduct a qualitative and quantitative evaluation of the national railway system.

n) Conduct research related to the improvement of railway activities in the country.

o) Carry out the railway part of the National Transportation Plan.

To achieve these objectives, an extensive chain of jobs and standardized activities was generated. This chain directly influenced the regions where the railway was implemented. An example of this movement is the so-called "casas de turma" (crew houses), which were residences built by RFFSA for employees. These houses were inhabited by locomotive engineers, brake operators, switch operators, firemen, permanent way engineers, station masters, among others. The proper functioning and maintenance of the rail lines were ensured by these professionals always living with their families in the vicinity of the workplace. In the book "Pelos Trilhos," the authors highlight that the construction of workers' villages not only met the needs of the RFFSA and addressed workers' housing demands but also contributed to the formation of a class identity (ANTONELLI; SANTOS, 2015).

This movement of a railway class identity was a symbol reinforced in the communities, where employees at all levels felt extremely honored to work for a company that supported them in various ways: education for children, pension plans, medical assistance, housing, among others (ANTONELLI; SANTOS, 2015). This support movement, along with class identification, also brought respect and prioritization to work on the railway.

With a total of 148,000 employees directly serving 19 Brazilian states, RFFSA had a strategic plan for workforce development, not only for internal staff but also for future employees. This movement, linked to existing respect and class identification, made education one of the main entry points into the company and a fundamental pillar of the RFFSA's development strategy (PAIVA; PAIVA, 2023).

Currently, according to a survey by IBRAM – Mineração do Brasil, the country had 80 thousand people working on the railway in 2017. (QUAL A IMPORTÂNCIA DAS FERROVIAS PARA O DESENVOLVIMENTO SOCIOECONÔMICO?, 2017). No current official published data was found.

2.1. The Professional Training Centres (CFP)

A RFFSA had Professional Training Centres (CFPs) in the main states of Brazil, with its main units: Jaboatão (Pernambuco), Alagoinhas (Bahia), Belo Horizonte (Minas Gerais), Além Paraíba (Minas Gerais), Barra do Piraí (Rio de Janeiro), Engenho de Dentro (Rio de Janeiro), Governador Portela (Rio de Janeiro), São Paulo (São Paulo), Bauru (São Paulo), Curitiba (Paraná), Santa Maria (Rio Grande do Sul) and Mafra (Santa Catarina) (A IDENTIDADE PROFISSIONAL E A PREPARAÇÃO PARA O TRABALHO NO CENTRO DE FORMAÇÃO PROFISSIONAL DE SANTA MARIA (RFFSA/SENAI) - 1973 A 1996, 2011). The geographic dispersion of the CFPs can be observed in Figure 2 below.

Figure 2: The geographic dispersion of the CFPs da RFFSA.

Source: From the authors, 2023.

The educational conception of the training centers was based on the training of student-learners aged between 14 and 18, who participated in technical training for 3 years at the CFPs. The activities were planned for full-time duration in work environments (8 hours daily), monitored and administered by a team of school directors and supervisors, overseen by the directors of the RFFSA (A IDENTIDADE PROFISSIONAL E A PREPARAÇÃO PARA O TRABALHO NO CENTRO DE FORMAÇÃO PROFISSIONAL DE SANTA MARIA (RFFSA/SENAI) - 1973 A 1996, 2011).

The student-learners who enrolled in the Training Centers, whether for mechanical, electrical, or railway operations training, were guaranteed an excellent professional education, as well as entry into the job market. These graduates constituted a workforce for RFFSA, as well as for the industrial market. The centers operated based on the Fordism concept, where the student received new techno-operational guidelines and performed them in their tasks, following a step-by-step escalation of previous actions until acquiring the new skills required for the task. All these stages were rigorously evaluated by the responsible instructors and monitors. This model aimed to train a professional capable of mobilizing content and meanings in relation to instrumental preparation.

The competencies of a professional considered suitable for entry into RFFSA positions were well-defined, constructed, and selected during the work training process. This perspective marks the structural relationship of the school with society since the educational model of the Training Centers addressed not only technical aspects but also behavioral skills. The curriculum proposal was divided into three major milestones:"

i) **Milestone 1: Professional Practice**

(1) Basic operations.
(2) Basic areas.
(3) Basic qualifications.
(4) Supervised internship.

ii) Milestone 2: Technological, Methodological, and Organizational Foundations

(1) Disciplines related to industrial measurement, technology, technical drawing.

(2) Support for the work environment: industrial hygiene and safety, first aid, accident prevention.

iii) Milestone 3: Organizational Training

(1) Verbal and written communication.

(2) Sciences.

(3) Moral and ethical education.

(4) Physical education.

(5) Integration and mathematics.

All curriculum vitae disciplines were linked to real-life activities of a company employee. An example is the discipline of verbal and written communication, which focused on constructing reports and technical reports necessary for correct communication among peers and leaders.

The professional identity model in railway schools not only influenced how professionals were recognized but also how they would assert themselves and perceive themselves as workers.

The Railway Professional Training Centers concluded in 1996 with the closure of RFFSA and the separation of the 18 regional railways into concessions for private companies. With their closure, technical training over the years gradually shifted towards more general forms through technical and vocational courses in the market.

2.2. The demand for specialized workforce

Brazil has embarked on a new cycle of infrastructure expansion, with an ambitious logistics investment program, focusing on railway connections. Approximately R$217 billion reais in investments were planned until the year 2022 for

concessions in railways, ports, and terminals, aiming to minimize the existing gaps in our logistics matrix (AEAMESP, 2020).

The gaps in freight and passenger transport apply directly to the railway and metro sectors. Due to this factor, increasing investments are being made in the modal, through the early renewal of freight railway concessions and the privatization and opening of new lines for passenger transport (AEAMESP, 2020). These projects and investments highlight the need for companies to have qualified individuals for both project development and maintenance, as well as asset management. However, unlike the historical context with RFFSA, we need individuals who, in addition to knowledge in mechanical and electrical areas, are also attentive to the technological demands of the sector.

From the optimistic market perspectives, a new demand emerges for both the government and companies, as well as the education sector in the railway industry – that of promoting the qualifications of professionals to meet the sector's demand. We have a gap that developed from the closure of specialized training centers, mainly in the areas of station agent, train operator, switchman, railway maintenance mechanic, railway maintenance electrician, permanent way maintainer, and railway maintenance technician (AEAMESP, 2020).

It is estimated that between 500 and 1000 professionals are employed in the railway sector annually, an approximate percentage of 1.5 to 3.5% of the number of engineers graduating annually in Brazil. In addition to staff positions, there is a high demand for other technical professionals.

Designing, building, and maintaining modern and complex railway structures require a highly specialized workforce, sometimes specific to each railway operator. Civil engineers, mechanics, electricians, maintenance technicians, and a diverse range of professionals play essential roles in the conception, implementation, and effective operation of this mode of transport.

"For the conception, design, and execution of a metro line, more than 20 technical specialties are required, more than in the naval and even aerospace industry. It is literally a perfect gear!" mentioned the coordinator of Contracts, Budget, and Contract Management, Mariana Yassuda in the 5th edition of the "Metroferroviário Professional Profile" on the Shared Engineering Portal.

Investing in the training and development of these professionals is crucial to meet the growing demand and ensure the quality and safety of railway transport.

To address this shortage of technicians and qualified professionals, it is essential to implement more effective educational policies. This includes the development of programs to encourage technical training, partnerships between educational institutions and sector companies for internships and practical training, and continuous revision and updating of technical course curricula to align them with the real needs of the job market.

2.3. Private strategies for meeting demand

To overcome these projections, in the last decade, the companies associated with ANTF initiated a permanent investment program that, until the year 2020, consumed R$ 340 million for the training and development of employees, and the resumption of railway courses with academic institutions, including public and private ones. The goal is to meet the demand for labor in the careers of railway technicians and engineers, through partnerships with educational institutions such as Fundação Dom Cabral/MG, PUC/MG, IME/RJ, Coppead/UFRJ, Instituto de Administração (FIA), and Senai.

The companies also have a history of internal talent development through training programs for train operators, switchmen, and managers. Programs have been created for both higher education (specializations and leadership) and technical education (apprenticeships, internships, and trainees) aimed at qualification and professional development. However, these programs are linked only to the companies and do not generate certificates valid in other industrial and logistics sectors.

In the meantime with the initiatives of the companies, the National Railway Transport Association (ANTF) was part of the core group that developed the Programa Avançado de Capacitação do Transporte (Advanced Transportation Training Program), coordinated by the ITL - Instituto de Transporte e Logística (Institute of Transportation and Logistics) and promoted by Sest Senat, both of the CNT - Confederação Nacional dos Transportes (National Confederation of

Transport), with the aim of fostering the development of scientific research. Additionally, exchanges are conducted with companies and entities from other countries, such as the International Certification in Railway and Metro Rail Systems Management, intended for professionals working in companies that operate rail cargo and passenger transport in Brazil. The course is taught by the DB Rail Academy, part of the Deutsche Bahn Group, one of the world leaders in passenger mobility and logistics services. The International Certification is coordinated by the ITL and promoted by Sest Senat - both entities of the CNT System - and had the cooperation of ANTF and the ANPTrilhos – Associação Nacional dos Transportadores de Passageiros sobre Trilhos (National Association of Passenger Rail Transporter).

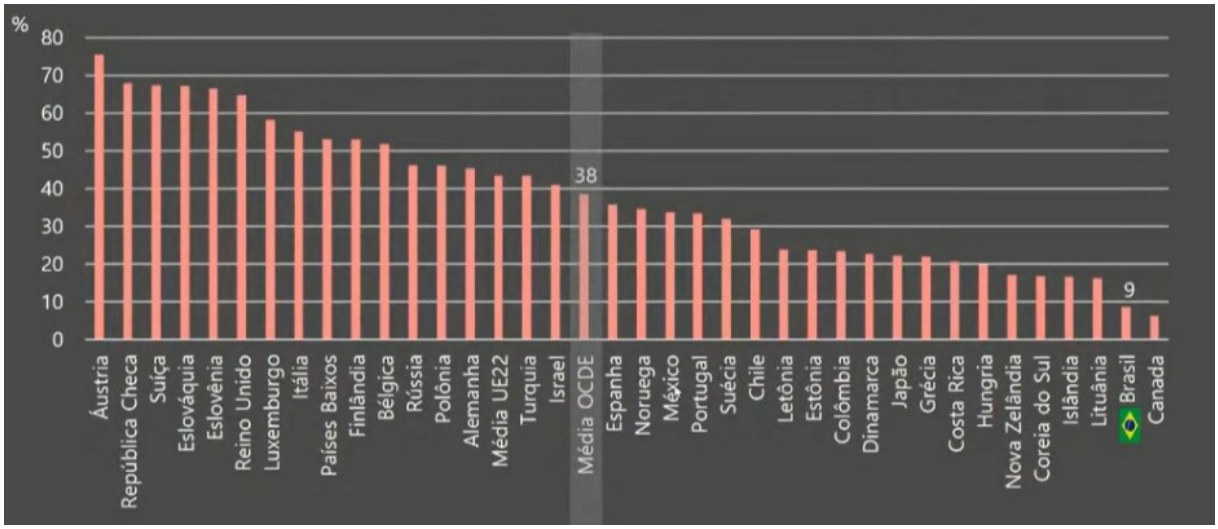
2.4. Government strategies for meeting demand

This trend of generalizing technical knowledge of railways, coupled with the reduction of other forms of technical centres in industrial sectors, has led to the impoverishment of the previously established model of class identity and a decrease in demand for vocational education in the country. Supporting this analysis, we can cite two movements:

i) Change in the technical high school model: Technical schools may offer technical subjects only in off-hours, and immersion in companies is no longer mandatory (SISTEMA... 2018). This factor leads to a reduction in the connection between student-apprentice and the workplace.

ii) Decrease in demand for vocational high school education: According to data from the OECD (2023) report on education, Brazil is the second-worst country in terms of technical and vocational education rates among high school graduates, with only 9%. For comparison, the average for the participating group is 38%. The distribution of the percentage of completion of vocational high school education can be seen in Graph 5 below.

Graph 5: Percentage of completion of vocational high school education who obtained a technical and vocational education.



Source: OCDE, 2023.

Bringing the OECD report (2023) as a reference, only about 16% of these graduates are linked to the engineering, manufacturing, and construction sectors. The highest percentage of technical education in the country is related to the health sector.

These phenomena in Brazilian education can also be analyzed through the low government investment per student. Currently, the country has the third-lowest investment per student, at around $3,583 annually, a value 7 times lower than the highest investment (OECD, 2023).

According to the report of UNESCO (2015), there are predominant factors in the low enrollment in vocational courses, which are also related to the closure of RFFSA's CFPs. There is a challenge in our education system, which already has a robust and rigid structure, to integrate regular school with practice. This integration involves various points, such as the prejudice established with this type of education, assuming that it is the endpoint of a person's education and not an important stage. This prejudice is old and carries the idea that technical education is for the poor who will be workers and that university is for the elite. This historical division remains in the imagination of Brazilians and needs to be removed, as vocational education is a development strategy.

Another extremely important factor is the 24% of young people aged 18 to 24 who neither work nor study. These young people, called the "neither-nor generation,"

end up becoming invisible in society, as they are performing activities without a formal employment link, either without registration or by supporting their family units. School dropout (due to difficulty in keeping up with what is taught each year, without a connection to daily life) and early pregnancy are the two major offenders in this group.

The PNE (2020) –The National Education Plan, has actions linked to increasing the number of enrollments in technical education at the secondary level, with the goal of reaching 5.2 million enrollments by 2024 (AGÊNCIA DE NOTÍCIAS DA INDUSTRIA, 2021). One of the proposals is that the new high school - which includes vocational education in one of the five formative pathways - is an opportunity to correct the distortion in the Brazilian educational matrix, which focuses on preparation for higher education.

In addition to offering training that serves as an entry point to the job market and preparation for college, technical education in high school can also engage students and reduce dropout rates and occupational segregation by gender (areas and professions considered "masculine" and "feminine"). To ensure that the career choices of girls and women are no longer influenced by traditional gender roles, it is necessary to bring the world of work into the classroom and enable the construction of life and career projects, addressing the opportunities in each area (AGENCIA DE NOTÍCIAS DA INDUSTRIA, 2021).

For this point, Brazil has a significant cultural advantage compared to other countries. While in other nations men are the majority among high school graduates with vocational training, in Brazil, women represent 56%. The index is very close to that of higher education, where they are 54%. The comparison of the percentage between men and women who complete high school among the countries that are part of the OECD is represented in Graph 6 OECD (2023).

Graph 6: Percentage of high school graduates who are male, by type of education

Source: OCDE, 2023.

It is evident that there are various initiatives to recover intellectual capital, both private initiatives specifically focused on technical and management training in railway systems, and governmental actions with an interesting foundation to support the growing demands of the rail and metro sector. However, these actions are carried out on an ad-hoc and individual basis, lacking a concrete and connected approach for the comprehensive development of the sector. The sector, with its growth and specialties, requires a standardized formalization of knowledge and a program that supports the growth and monitoring of all fronts of necessary collaborators, from technical to managerial roles.

3. PERCEPCTIONS AND ACTIONS OF THE SECTOR FOR TALENT DEVELOPMENT AND RETENTION

According to data from the Brazilian Ministry of Education, there has been a significant decrease in the number of enrollments in technical courses in recent years. This reflects the growing preference of new generations for higher education courses over technical careers, often opting for more "modern" or technology-related professions, sidelining careers in the infrastructure and transportation sector. This results in lower demand for technical courses related to these areas, directly impacting the availability of courses and specialized professionals.

A real example of this difficulty can be observed in the field of railway engineering. Based on surveys conducted by the Brazilian Railway Industry Association - ABIFER it is estimated that the lack of qualified professionals in this area has directly impacted the planning and execution capacity of expansion and modernization projects in the country's railway systems.

The lack of investments and policies focused on technical education exacerbate this situation, making it difficult to form a specialized workforce. This situation requires efficient educational policies, incentives for technical training, and continuous curriculum updates to meet the evolving market needs.

Furthermore, the quality of technical education has been frequently questioned. Many technical education institutions, both in Brazil and in other countries, face challenges in offering up-to-date programs aligned with market demands. The gap between acquired knowledge and the skills required in the workplace often contributes to the technicians' lack of preparedness upon entering the job market, making it difficult to fill positions in critical sectors such as rail-metro and infrastructure.

Another relevant factor to consider is the aging of the workforce, a trend observable in both Brazil and other parts of the world, including the railway sector. In Brazil, there has been a significant increase in the presence of workers aged 50 or older in the labor market. According to a survey, the participation of this group in formal employment grew by 51.6% over a decade and a half, with the percentage of workers in this age group rising from 12.6% in 2006 to 19.1% in 2021. This trend points to a reversal of the age pyramid of the Brazilian population, with the number of Brazilians over 50 increasing by 63.2% in 15 years.

Additionally, the United Nations - ONU predicts that by 2040, Brazil will have 66.5 million inhabitants aged 60 and over. This indicates the need for companies to adapt to accommodate an older workforce. This involves not only policies for requalification and professional updating but also the creation of work environments that value the experience and diversity that senior professionals bring.

Gathering information on how employers have perceived the growing need for actions and implementation of policies and practices aimed at expanding the adherence of professionals, with a profile, purpose, and satisfaction in belonging, to

operational and maintenance positions was the objective of this stage of the work that will be described in this chapter. To achieve this goal, interviews were conducted with railway and metro professionals, covering different regions of operation in the country, such as the South, Southeast, Midwest, and Northeast.

The strategy for composing the interviews, covering perceptions and experiences in different roles, was carried out by seeking professionals working in Human Resources areas, active in Training, Recruitment and Selection, and Diversity, as well as career professionals in Maintenance and Operation roles, working in leadership or operational positions. To provide a comprehensive view within the strategy of diagnosing the fronts of action, interviews were conducted with institutions that strategically manage and plan educational and retention actions in the sector. One of these consulted institutions is the National Association of Railway Transporters - ANTF, a national nonprofit institution focused on the development and improvement of freight transport by rail in the country since the privatization process initiated by the Federal Government in 1996.

Content evaluations were also used to compose the work, including books, magazines, articles, and works carried out and published by colleagues in areas such as Maintenance and Human Resources, in master's or postgraduate courses.

It became clear that there are various qualitative analyses available, but quantitative data sources are still scarce externally, whether data disclosed and published by employing companies or even by regulatory agencies or bodies, specifically regarding the workforce addressed in this work.

3.1. Training and capacity building of intellectual capital

As explored by Cardozo *et al.* (2022):

> Today, within the Brazilian railway sector, universities, schools and corporate training centers present on large railways (MRS, VLI, VALE, EFVM, EFC, RUMO) have emerged almost exclusively to meet their internal training and technical skills training needs. of operation and maintenance activities of railway assets. Where almost exclusively all training and training is given in the format of building the basis for training the development plan of each employee who is already working and hired within the company. At a global level, it is worth highlighting that the first corporate university was created by General Electric (GE), in 1955, in the city of Crotonville (CARDOZO et al. 2022).

The strategy commonly used by companies in the railway and subway sector to form their intellectual capital is to separate training by function and position of the employee. Among the companies surveyed, 70% to 80% of employees are linked to railway operations. It was possible to identify a common line between the formations, as detailed below.

3.1.1. Young Apprentices Program

Originating from a law in force for almost 21 years, the Young Apprentice Program is a federal initiative that aims to encourage companies and public agencies to hire young people aged 14 to 24, as well as individuals with special needs, with no age limit (AGÊNCIA BRASIL, 2021). In addition to providing young people with an opportunity for professional learning and, in many cases, an entryway into the formal job market, the public policy to encourage the hiring of apprentices also seeks to qualify the workforce that the productive sector needs (AGÊNCIA BRASIL, 2021). During the interviews, the program was mentioned as this gateway, especially as a strategy for qualified basic workforce training, mainly in maintenance sectors. In specific cases, we collected reports of 40 to 50% of apprentices being retained in the railway industry.

For the implementation of this program, companies specialized in apprenticeship support with the technical training of students, such as SENAI, CIEE, Espro, among other entities.

During the collection of information and perceptions from the sector, it was also possible to understand the dynamics of the relationship between apprentice students and companies and the impacts on corporate daily life. As they are a group of young individuals with no organizational experience, obstacles related to time management, rules, and interpersonal relationships are encountered.

Another point of extreme importance is the short-term loss of these professionals. Approximately 50% of professionals trained in 5 years seek opportunities outside the railway sector, mainly because they have cross-cutting qualifications that can be used in the market, such as mechanics and electrical skills. In Brazil, at the time of the interviews, we only have the positions of Shunter and Railway Mechanic specifically available for the sector, and these courses are not nationally widespread, being offered in a few cities in the Southeast.

Regarding diversity, the entry of women through this program has revolved around 20 to 25% female representation.

3.1.2. Technical Interns

Another way of entry and development for professionals is the technical internship, which can be carried out by students enrolled in vocational or higher education. This is another way to attract younger employees to companies and promotes the opportunity to enhance their knowledge in a healthy and productive work environment, through Law No. 11,788 (CIA DE ESTAGIOS, 2023).

During the interviews, we noticed that the largest contingent of interns comes from higher education, and few efforts are structured to attract interns in technical courses. This is corroborated by the low number of students in technical education, as mentioned in the previous chapter of this work, as well as the non-obligation of this group to carry out practical internships.

In Brazil, there are specific courses for the railway market, both at the technical and higher levels. However, the geographical dispersion of these courses is still deficient when compared to the national railway network. Table 1 lists the courses related to railway and subway education.

Table 1: Technical and higher education courses for the railway sector.

Type	Course	Institution	Location
Technician	Maintenance of Metro Railway Systems	IF Sudeste MG	Santos Dumont/ MG
Technician	Charge Transport	IF Sudeste MG	Santos Dumont/ MG
Technician	Maintenance of Metro Railway Systems	SENAI SP	São Paulo / SP
Technician	Maintenance of Metro Railway Systems	SENAI SP	São Paulo / SP
Technician	Rail Transport Systems Maintenance Electrician	SENAI SP	São Paulo / SP
Technician	Metro Railway Maintenance	FAETEC	Rio de Janeiro / RJ
Higher	Railway and Metro Engineering	IF Sudeste MG	Santos Dumont/ MG
Higher	Railway and Metro Engineering	UFSC	Joinville / SC
Higher	Railway Engineering and Logistics	UFPA	São Luís / MA

Source: From the authors, 2023.

3.1.3. Valorization of “Prata da Casa” (in-house Workers)

In addition to actions aimed at attracting young talents to companies, strengthened by the country's laws, companies have structural but specific (aimed only at their internal audience) development initiatives. This point is a fundamental pillar in talent retention and the consolidation of internal knowledge management within institutions.

Among the actions discussed during field research, we can mention:

i. Operational Schools: structured training in the form of learning paths, separated by position or area of operation, used to familiarize, and deepen employees' knowledge in railway technical subjects. The training is conducted by the company's own instructors or industry-related companies, such as equipment suppliers. Examples of these formations are paths for understanding and improving knowledge in the mechanical and electrical maintenance of locomotives.
ii. Incentives for education: internal policies to support employees' education in vocational, technical, and higher education courses, through total or partial subsidy of the necessary investment. The requested counterpart is usually linked to having a thesis or final project linked to the company.
iii. Development programs: formations designed according to the strategies and demands of the companies for the alignment of technical and management concepts.

Employee appreciation is not only about education but is also highly related to career development. Promotions and movements that prioritize internal talents before conducting external searches, known as the "stepping-stone" effect in the sector, are mentioned as a well-evaluated practice. When an opportunity opens up, it replicates with promotions in a cascading effect, generating a future-oriented view among employees. They feel more encouraged to invest in the company because it invests equally in them.

3.2. Incorporating “Cabeças-brancas” (white heads) into the team

There are initiatives in railways, found in isolation, aimed at hiring professionals in a different age group than usual, targeting individuals above 40 years old instead of the typical age range of 20 to 40 years. This action, which can occur in both fixed-term or indefinite contract models, aims to reclaim technical knowledge that may have been lost in some areas of the companies. This supports not only knowledge management in the field but also serves as another form of reinforcement and training for younger teams in the industry.

This trend is also observed in other Brazilian markets, as mentioned by Sollitto (2023), where hirings of individuals between 40 and 50 years old increased by 95% from January to September 2021 compared to the same period the previous year. This phenomenon is expected to consolidate, as companies from various sectors have initiated attraction programs with the goal of incorporating individuals over 40 into their workforce.

3.3. Focus beyond the hard skills

With the technologies and specificities emerging for the sector, advancements and improvements in maintenance and operation services require that the profile of professionals, even those directly involved in more operational activities, possess behavioral characteristics and qualities, known as soft skills. These include communication, proactivity, and learning agility, which are practices to facilitate quick learning.

Therefore, companies in the sector are already investing in developing individuals' behavioral qualities, in addition to the technical skills traditionally required. Attitude and initiative are of utmost importance and enhance the results of training in the medium and long term, also contributing to the retention of professionals.

This action has been reported in various forms, including by institutions such as SEST and SENAI, and can take the form of programs or training modules that run concurrently with capacity-building programs or are part of them.

3.4. Connecting supply and demand

After collecting perceptions through interviews, focusing on understanding, and diagnosing actions related to the attraction, retention, and development of people, some reports were cross-cutting and are important to mention. These reports allow us to understand some systemic facts not found in bibliographic references but based on the experience of key figures within the sector.

The first point mentioned is that the railway does not have the visibility it deserves, and the number of people interested in entering the industry is not sufficient to meet the demands, especially when it comes to technical and operational positions. This point is intrinsically linked to the loss of railway class consciousness discussed in the previous chapter.

It is not precisely known why this class identification has been lost, but as a hypothesis, it is believed that the lack of appreciation and remuneration for more operational positions, such as train operators, may have led the younger generation not to aspire to pursue a career in rail, discontinuing what happened in the past when the role and love for the railway were passed from father to son. The promotion of industries like automotive and construction also contributed to this shift in the population's focus on job opportunities and careers in the railway sector.

Another point addressed is the lack of specificity for the railway in most training offered by institutions and chosen by professionals. As shown during the development, few educational centers offer courses focused on the sector, and these are centralized in a single location or in areas where the railway does not have a direct impact.

With this, companies have an even greater need to develop internal programs to align and train basic concepts about railways, as well as the development of more robust actions. An example is the development of specific courses for Technicians in Roads with an emphasis on permanent way and Postgraduate in Permanent Way, actions carried out entirely by two interviewed companies.

4. NATIONAL AND INTERNATIONAL PRACTICES FOR TALENT DEVELOPMENT

In this chapter we will mention practices in the market linked to the rail and metro sector for attracting and retaining talent, as well as strengthening it within companies.

4.1. European and American initiatives

4.1.1. European initiatives

i. Europe Transforming Europe's Rail System: The proposed European Rail Partnership will actively seek to promote inclusion by targeting research, technologies, solutions, and services that strengthen Europe's social market economy. By developing new technologies, solutions, and services, especially enabled by digitalization and automation, the proposal will provide a framework for the rail and non-rail workforce to engage in different activities to reconcile the social and market dimensions. To this end, the proposal will promote technological and operational solutions that meet a new Concept of Operations for Railways, through a System of Systems service-oriented approach, in which an integrated railroad system, including freight, urban, suburban, regional, and mainline, will reach its full potential. This is done while respecting the specific needs and operational requirements of those who represent different elements of the whole.

ii. Flagship Area 3 (FA3) - Intelligent & Integrated asset management: The aim of this project is to provide new innovative technical requirements, methods, state-of-the-art solutions, and services to minimize asset lifecycle costs or extend their lifecycles, while addressing safety and improving the reliability, availability, and capacity of the railway system, addressing both infrastructure and rolling stock. The expected result will be a common European asset management framework comprising a set of green, digital, and safe solutions for the rail sector, focusing on three interrelated areas: Asset management;

Advanced, high-tech automated execution of construction and interventions; and Eco-friendly production of resilient assets.

iii. European Green Deal: The creation of Green Deal mobility and transport solutions depends on a rail system capable of adequately meeting the evolving needs of customers and the urgent demands of decarbonization, responding in conjunction with other modes, promoting social cohesion and integrating socio-economic development with a systemic, intelligent, and sustainable operating concept. The metro sector is one of the alternatives for decarbonization in the European Union.

4.1.2. American initiatives

iv. Expanding Summer Youth Programs in Rail through Virtual Learning and a National Campus Network: The aim of the project is to develop a standardized curriculum of online resources and hands-on activities to expand interest in rail industry careers, creating a new pipeline of talent prepared to enter rail industry careers.

v. The Railroaders of the Mid-Century: The railroad program will increase the interest of Pre-kindergarten to 12th graders (ages 4 to 18 years old) into railroads, developing talent from the ground-up that is of value to railroads and a new image for the railroad industry by implementing new technologies - The Railroaders of the Mid-Century (2050s). The youth will be exposed to futuristic skills and training and will target areas of interest to the railroads.

vi. Railroading Education - On Track to a Great Career: Raise the visibility and appreciation of railroading careers as a high-tech industry, among intermediate school, high school, and community college students, with an emphasis on students from minority and underrepresented rural communities in the San Joaquin Valley. The project will: (1) survey railroad industry organizations to determine current best recruiting practices; (2) collaborate with freight and passenger railroads to determine what railway career opportunities will be today and in the future; (3) research and compile best STEM program practices; (4) engage students in under-represented

communities of San Joaquin Valley to measure effectiveness of various outreach strategies; (5) create a railroad careers student outreach toolbox; and (6) develop and implement pilot student railroad outreach programs.

4.2. Brazilian initiatives

Workforce from abroad interested in working in Brazil: SEST SENAT currently cooperates with countries such as Mozambique and Guatemala with expertise in professional training and content. For the future, it is seen as an opportunity and a great possibility that Brazil will also begin to absorb foreign labor in the transport sector, and this could inspire it to expand to the subway sector. To consolidate this scenario in the sector, partnerships are needed between the S system, of which Sest Senat is a part, and the private sector, determining roles and responsibilities, investments and guarantees that the private sector can provide for those trained by the institutions. The opportunity to open vacancies for professionals from other countries to enter the Brazilian job market is already happening in other sectors in an isolated, timid, and still fairly informal way, so it is showing itself to be a strong trend and an opportunity for the subway railroad sector.

Gender Diversity - Inclusion of women in operational areas: SEST SENAT is focused on training women to work in operational areas. Based on the requests and movements of companies in the metro rail sector, classes exclusively for women and focused on gender are emerging and have been yielding good results. The initiative is also in line with the global ESG objective of female leadership on the sustainable agenda.

4.3. Gender diversity in the rail and metro sectors

One of the reasons for the differentiated approach to gender diversity in the industry comes from the target set by the UN, focusing on achieving 30% of women in senior leadership positions by 2030. To achieve this figure, which aims to increase women's participation in the labor market, equalize opportunities and boost their

presence in leadership positions, structuring actions within companies must be carried out to not only train leaders, but to structure the entire management chain, strengthening it (UN Women Brazil, 2017).

An initiative created prior to the aforementioned goal, in 2012 in the United Kingdom, is "Women in Rail", which aims to improve diversity in the British rail industry, given that less than a fifth of positions in the rail industry are held by women, and stereotypes still shape the public perception of the sector. Fortunately, the rail industry has worked collectively to challenge this.

Already in the United States, the Labor Department has released data indicating that women have fallen behind men in returning to the workforce, with the participation rate for men rising 70% in January, compared to just 58% for women. This was mainly due to the COVID-19 pandemic.

What is worrying is that this disparity has significant economic implications, which could slow down the recovery and reinforce gender inequalities. Several factors contribute to this, such as difficulties with childcare, the impact on sectors with a higher concentration of women and the lack of flexibility at work. It is crucial to understand these reasons and seek solutions, such as strengthening family support networks, supporting remote working policies, and investing in retraining programs.

According to Consceição (2020), gender diversity faces difficulties due to some unconscious gender biases, and becoming aware of the existence of these biases is the first step towards changing the market and actions. These biases can be detailed in:

a. Maternity bias: a tendency to characterize women who are mothers as less competent or less committed to their work.
b. Affinity bias: tendency to choose people with whom one has more ties.
c. Behavioral bias: tendency to expect a certain behavior from a person.
d. Performance bias: tendency to value men's work more highly and underestimate women's work.
e. Perception bias: a tendency to reinforce stereotypes or assumptions about a particular member or group of people, without any concrete basis for doing so.

f. Confirmatory bias: the tendency to seek confirmation of one's beliefs about a particular group or person. In the quest to confirm this information, other references that call these pre-existing beliefs into question are neglected.

5. BEST PRACTICES GUIDE

During the course of this work, it was possible to identify important insights into the railroad market, from its history to its future challenges. During the contextualization, it is possible to assess the relationship between the railroads and the employment generated in the regions and how this transport model has influenced not only the logistics of cities and regions, but also the economy and culture of various areas.

Through the interviews and research in the sector, it was possible to identify the actions that rail and metro companies take to attract, train and retain their talent, and it was possible to find points of discrepancy between projects, as well as a common line of development for the sector. Corroborating the perceptions gathered, we advanced in our knowledge of personal development practices in Brazil and around the world, also addressing an extremely important point: diversity within companies.

From the convergence of these materials and knowledge, it is possible to explore the scenario of attracting, training and retaining talent in a complete way, and above all, to identify a line of reasoning that allows good practices to be shared in the sector, aiming for greater evolution of our systems and support for the sector's future challenges.

We will mention some of the practices that have already been carried out or that we plan and intend to carry out in the future:

a. Community & Rail Connection:

In the interviews and publications, the opportunity to improve was mentioned, given that it is still rarely carried out, and in a specific and regional way, to bring the railroads closer to the surrounding community. The culture of the railroad is a well-

known factor, but one that is not very strong, but which supports the development of many future professionals. It is seen in a positive light by those taking part in this work and those interviewed that the desire for a railroad career can begin with this relationship between the community and the railroad, from the initial contact, with the introduction of children to the sector, to the connection and employability generated directly in the region.

A proposed symbiotic relationship, Railway & Community, which aims to provide progress and quality of life, is cited in researched works, and well received by those who hear it. This practice is based on supporting the development of the community's quality of life and generating an increase in society, improving the region's economy, boosting business, and increasing physical interventions to improve municipal infrastructure, for example. Some companies are understanding that is more effective to qualify and seek employees in areas closer to the rails, making people closer to their roots and reducing the chances of turnover linked to family displacements.

The community strongly perceives the positivity of the railroad's presence in their lives and passes on the desire for the sector's professions and opportunities for advancement from generation to generation to each family that is formed around the community with a symbiotic relationship with the railroad.

Another important front is the scholarship and sponsorship programs in the communities around the railroad, generating knowledge in the region, reinforcing the railroad as a partner in community development and training skilled workers with a cultural link to the railroad.

b. Connecting railroads and subways

Development of a focus group with participants from the rail and metro sectors, for close exchange of information from the sector. Many of the companies in the sectors focused on in this work have indicated that they have even more robust and strategic proposals for people development, but these have a high investment value or the company doesn't have enough internal staff to develop them. Having a group that can share these ideas and work together to develop them supports the development of companies, communities and employees alike. Specific actions in

this format have already taken place, but it is important that not just the freight or passenger sectors are involved, but both.

This group should also include participants from the transport support sectors, such as the S system and other entities. Another important objective to mention is the role of developing and analyzing the sector, through data collection, surveys and sector studies to understand trends, qualification needs and skills gaps.

c. Structured training and programs

Work together to develop training that directly meets the needs of the sector, ensuring that graduates are ready for the industry. Alongside this, reinforce internship programs, mainly technical, and practical training programs for students, providing real experience in the field.

In addition to internships, consistently holding lectures and workshops at educational institutions, sharing practical knowledge and industry trends, and making opportunities within the railroad more visible.

For employees within the companies, it is important to carry out mentoring programs, where experienced professionals can guide students or recent graduates.

d. Development of regulatory standards and monitoring system

Implementation of stricter and more uniform regulatory standards for the rail industry, including aspects of safety, staff training and equipment maintenance.

e. Collaborative Curricula

Working together to develop curricula that directly meet the needs of the sector, ensuring that graduates are ready for the industry. Allied to this action, blind selection processes are carried out, where during the evaluation of the candidate's profile and competence throughout the process no gender or color is revealed, making no such distinction.

f. Employer branding

This strategy is one of the main ones found as a way of generating a positive perception in the market and attracting and retaining talent. Actions linked to the

dissemination of the company's culture, presentation of employee appreciation, professional development, digital presence and participation in external events and links with communities and educational institutions, strengthening the endorsement of its organizational culture beyond the company.

g. Actions based on diversity and inclusion

These are actions linked not only to the development of diverse groups, but also to improving the environment in which these groups operate. Actions such as infrastructure adjustments in the workplace and flexible working hours for employees who are mothers. The use of affirmative action was also listed as a welcome practice by those interviewed, as one of the solutions for achieving more equal percentages between groups in an organization.

h. Career acceleration programs

Actions with a commitment to society to foster the career development of women, black people, people in situations of social vulnerability and other groups, with the aim of accelerating their professional development, training them in competencies and skills to stand out in the job market, in various areas and positions.

i. Learning methodologies aligned not only with technical needs, but also with the target audience

The traditional learning process, where trainees sit in a classroom and watch a few hours of training, is seen as ineffective. Making use of new learning methodologies, whether through face-to-face or digital formats, generates greater student engagement during the transfer of knowledge, a direct link to why they are learning the subject and, above all, the practical side and experience in the job market, in a controlled environment that allows for dialogue between those who receive the knowledge and those who pass it on, as well as chances to test, make mistakes and correct.

6. CLOSING REMARKS

In summary, the challenges and opportunities presented to the metro-rail segment reveal a dynamic and complex scenario that demands strategic action and commitment. The expansion and modernization of the infrastructure, coupled with constant technological evolution, highlight the pressing need for qualified professionals in various areas, from engineering and technology to finance and project management.

The transformation of this modal, driven by globalization, digitalization, and automation, requires agile adaptation by specialists in information technology, cybersecurity and automation. At the same time, the aging of the workforce highlights the urgency of training and bringing in younger professionals, making it essential to invest in educational and training programs.

Competition with other sectors, especially those offering more attractive salaries and benefits, poses challenges in attracting talent. In this context, promoting diversity and inclusion is fundamental not only to reflect today's society, but also to broaden the spectrum of talent available to this segment.

The research carried out for this paper with companies in the sector, technical education schools and government institutions, on the attraction and retention of technical and qualified manpower in the metro rail sector, provided a comprehensive understanding of the challenges and opportunities faced by organizations in this modal. Throughout this study, we identified that the demand for diverse and qualified professionals in the sector is constantly growing, driven by the development and expansion of railroads.

Our study revealed that to face the challenges of talent shortages and growing competition for highly qualified professionals, companies need to adopt comprehensive strategies that go beyond simply looking for candidates. Attracting and retaining technical labor in the metro rail sector involves creating an attractive and healthy environment, investing in professional development, and training, and implementing competitive compensation and benefits policies.

The importance of developing partnerships with educational institutions and training programs was also highlighted as an effective way of guaranteeing the

training of new qualified professionals for the job market. In addition, the emphasis on promoting an inclusive organizational culture, which values diversity and provides opportunities for professional growth, can play a key role in retaining talent.

Ultimately, this study contributes to a deeper understanding of labor market dynamics in the metro rail sector and offers valuable insights for organizations looking to strengthen their technical workforce to meet current demand and future challenges.

Finally, the question remains:

"Should the railroad adapt to the profile of the professional being sought or should the professional adapt to the profile of the professional being sought?"

6.1. Proposals for future works

The research and topic of talent retention and training in the rail and metro market is extensive. Therefore, the following are proposals for future work, delving deeper into the subject.

- Assessment of the resumption of professional training centres by private companies - an economic study
- Evaluation of the methodology applied in technical training courses for the metro-railway sector according to market needs.
- Research and analysis of the trend of labor-deficient positions needed to meet future demand in the sector

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