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Factcheck
Adapting quality of VET offer to the need of industry – manufacturing sector

Electro sector Report

Developed by the University of Thessaly

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Contents

Abstract

The Fourth Industrial Revolution, also known as Industry 4.0, is based on the technologies of data exchange and automation and through them tends to modernize the production processes and manufacturing technologies in the industry sector.

Electronic and electrical engineering, using tools such as robotics, artificial intelligence, cloud computing, the Internet of Things (IoT), etc., plays an important role in the development and empowerment of Industry 4.0.

The new technologies that are introduced into the organization and the work processes inevitably affect the content of the work and the work profiles that exist to this day. Communication and interaction between people and technology becomes imperative and necessary to be able to cope with the needs of the new working conditions that are created.

Technological progress, however, relies heavily on comprehensive competences of workers and professionals. Such qualities as interdisciplinary teamwork, competent using of information and communication capabilities, awareness of quality management, creativity and resolution are becoming extremely important, naturally in addition to the essential professional competences.

The FactCheck project attempts to highlight through a survey the most desirable professional profiles and skills, required for someone to work with consistently high quality in businesses in the electrical industry sector, and to indicate tools and methods of connecting the labor market with vocational training.

Introduction

The transformation of the electro industry sector has been underway through digitization and automation of production systems for several years. The digitization of production and related management and planning information systems is combined with the automation of the use of data from production lines by machines.

The field of electrical and electronic engineering plays an important role in Industry 4.0, especially in the stages of design, development and application of various electronic devices and systems necessary in the manufacturing process.

Industry 4.0, driven by digitization, must be understood as an industrial-political process that reforms both industrial and craft work. Digitization, in the broadest sense, reaches all levels of society through the counting and computing of data necessary for machines to communicate and with machines and the IOT.

The digitization and automation of production processes is enhanced by technologies such as the Internet of Things (IoT), cloud computing, artificial intelligence and cyber-physical systems.

These technologies enable communication and data exchange between devices, improving performance, productivity and security in various industries.

The new working environment inevitably creates developments and new challenges in vocational education and training (VET). New job profiles are being created, in which the vocational education and training sector will have to directly provide the required knowledge and skills to trainers and trainees.

The new job positions that are created require increased skills in information technology as well as control and problem solving abilities. The traditional professional profiles in the electro industry require upgrading through training and education in order to follow developments and not be degraded.

In addition, new contemporary specialties will have to be created, with an emphasis on knowledge in the field of IT and automation, in order to handle and control modern production systems.

The Factcheck project aims to bridge the gap between vocational education and training and labor market needs, focusing specifically on the construction sector, particularly the electrical industry. Through a survey it is possible to collect data and analyze trends to identify areas for improvement and innovation. The ultimate goal is to ensure that training programs are aligned with the skills and knowledge required by employers in the electro industry sector.

In order to make a smooth transition to the new working reality, the providers of professional education and training in collaboration with the businesses of the sector should manage to develop profiles with the corresponding upgraded qualifications and specialization, which will help to ensure the professional security of the employees.

2. Steady state of electro labor market

The European electro industry sector represents a vital sector for the continent's economy, characterized by steady growth and evolving dynamics. With a diverse range of industries such as electronics manufacturing, electrical engineering, renewable energy, and telecommunications, this sector plays a pivotal role in driving technological advancements and innovation. Europe has a highly skilled workforce in the electro labor market, with professionals specializing in various disciplines such as circuit design, power systems, automation, and robotics.

The demand for these skilled workers remains consistent due to continuous advancements in technology and increasing consumer needs. Furthermore, the electro labor market has witnessed significant shifts towards sustainable practices. Renewable energy sources like wind and solar power have gained prominence across Europe, leading to an increased demand for professionals specializing in green technologies. The steady state of the European electro labor market is primarily driven by ongoing investments in research and development (R&D) activities.

The electro industry sector in Europe heavily relies on a skilled workforce to meet its growing demands.

Vocational education and training (VET) programs aim to equip individuals with the necessary knowledge and skills to succeed in this industry. While VET covers the needs of the electro industry to a certain extent, there are concerns regarding its accuracy in meeting industry requirements. There are increasing new job opportunities, but to take on new jobs, one needs to have the skills and knowledge that industries seek.

While VET programs aim to equip individuals with industry-specific skills, there is a growing concern regarding their accuracy in meeting the industry's requirements.

One crucial aspect is whether there are enough qualified workers entering the electro industry through VET. The dynamics of VET students in this sector vary across different European countries, making it challenging to determine if there will be a shortage of appropriately qualified workers. However, it has the highest rate of over qualification for tertiary educated workers across EU.

Required strengthening the responsiveness of secondary vocational education and training (VET) and tertiary education institutions to labor market needs. There are increasing new job opportunities, but to take on new jobs, one needs to have the skills and knowledge that industries seek. The dynamics of VET students need to be examined closely to determine if sufficient numbers are opting for vocational training in this field. Additionally, it is essential to assess whether these students possess the necessary skills and competencies upon completion of their training.

Moreover, assessing the quality and relevance of VET programs is vital, because these programs equipping students with the necessary skills and knowledge demanded by the evolving electro industry.

Currently, VET programs provide vocational training and education for electro workers, aiming to equip them with the necessary skills and knowledge required by the industry. However, it is essential to assess if these programs accurately cover the needs of the industry. Secondary VET programs with a significant work-based learning component have provided skills and knowledge relevant to occupations in high demand in the labor market.

The number of qualified workers is a vital aspect to consider. If there are not enough individuals completing VET programs and entering the workforce, a shortage of skilled electro workers may arise. It is crucial to analyze whether current enrollment numbers in VET programs align with industry demands. Furthermore, tracking the dynamics of VET students can help predict future shortages. Understanding factors such as student interest, enrollment trends, and completion rates can provide insights into potential gaps between supply and demand for skilled electro workers.

2.1 Skills shortage according CEDEFOP[1]

The electro industry become an innovation-driven, technologically advanced industry requiring more and more highly skilled technical people.

With the rapid evolution of technology and automation, companies are facing challenges in finding qualified workers who possess the necessary skills to meet industry demands. Increasing demand for skilled professionals is already outstripping the supply.

Let's see some skill shortages and challenges associated with electronic technicians job profiles in the Electro industry.

Rapid Technological Advancements: Electro industry is constantly evolving with new technologies and advancements. This rapid change can make it challenging for technicians to keep their skills up to date.

Technical Knowledge: Working in the electrical industry requires solid technical knowledge in electronics, electrical engineering, and other related fields. Technicians must understand the principles of electricity, circuits, digital electronics, and other fields to effectively diagnose and solve technical problems.

Complexity of Systems: Modern electronic devices and systems are becoming increasingly complex. Technicians need have a deep understanding of electronics theory and practical skills to troubleshoot and repair these systems effectively. Often creating a shortage of people with the necessary expertise to effectively operate these complex systems.

Troubleshooting Skills: Troubleshooting is an important process in the electrical industry. Every day complex problems appear on high-tech electronic systems that need an immediate solution. Problem solving is a skill that workers in the electrical industry should have. Technicians must be use diagnostic tools and techniques to locate faults, isolate problems and determine the best way to resolve them. This may include carrying out tests, measurements and inspections to collect relevant data.

[1] European Centre for the Development of Vocational Training

Digital transformation: As digitalization fully enters the electro industry, machine operators and electro technicians must be able to use digital tools and software in tasks such as programming machine tools or using computer-aided design software (CAD, CAM). Lack of digital skills may be a challenge facing the industry and needs to be addressed immediately.

Aging workforce: Many experienced electronics engineers are reaching retirement age, resulting in the loss of valuable skills and knowledge in the workforce. Without proper succession planning and efforts to attract young talent, this trend could exacerbate skills shortages in the industry.

Creativity and Innovation: The appearance of complex problems in the electrical industry is a daily issue. Addressing these problems often requires creativity and innovation to develop innovative solutions. Technicians will have to experiment with different approaches and combine existing techniques to find solutions.

Adaptability: The electrical industry is being transformed, with the emergence of new technologies, equipment and processes. Technicians must be willing to adapt to developments, train in new skills, tools and techniques to keep pace with changes and respond effectively to new challenges.

2.2 Skills development (SME needs according to OECD)

Skills development is crucial in the electro industry sector. To address the needs of subject matter experts (SMEs) in this field, it is important to align the skill development programs with the guidelines and recommendations provided by the Organization for Economic Co-operation and Development (OECD).

Based on OECD's research and reports, it is suggested to focus on the following areas for skill development in the electro industry sector:

- Technical Skills: Enhancing the knowledge and proficiency of SMEs in areas such as electrical engineering, electronics, renewable energy, and advanced manufacturing technologies.
- Digital Skills: Emphasizing on the development of digital literacy, data analysis, Internet of Things (IoT), and automation skills to keep up with the changing technological landscape.
- Soft Skills: Promoting the development of interpersonal skills, problem-solving abilities, communication skills, and critical thinking to enhance collaboration and innovation within the industry.
- Lifelong Learning: Encouraging SMEs to actively engage in continuous learning, upskilling, and reskilling to adapt to emerging technologies and industry trends.
- Industry-Relevant Training: Collaborating with industry partners to provide targeted training programs on specific areas of expertise, such as energy storage systems, power electronics, or smart grid technologies.

In addition to these recommendations, it is essential to establish partnerships with educational institutions, professional associations, and industry stakeholders to create comprehensive skill development programs. This can include workshops, certification programs, apprenticeships, and mentoring initiatives.

By focusing on these areas and implementing targeted skill development programs, the electro industry sector can ensure that SMEs are equipped with the necessary knowledge and capabilities to thrive in an ever-evolving industry landscape.

2.3 Occupational specific tasks electronic technician for devices and systems

In the electro industry sector, electronic technician for devices and systems refers to the use of various equipment and tools to perform tasks related to electrical systems, devices, and components. This sector encompasses a wide range of activities, from manufacturing and assembling electronic components to installing and maintaining electrical systems. Here are some occupational-specific tasks related to electronic technician for devices and systems in the electro industry sector:

- Circuit Board Assembly: Operating machines that assemble and solder components onto circuit boards. This includes loading components, soldering, and quality control.
- SMT (Surface Mount Technology) Equipment Operation: Using machines to place tiny surface-mount components onto circuit boards accurately. This requires precision and familiarity with different types of SMT equipment.
- Cable and Wire Harness Assembly: Operating machines to cut, strip, and terminate wires for creating cable assemblies and wire harnesses.
- Electrical Testing Equipment Operation: Operating testing equipment to ensure the functionality and quality of electronic products. This could involve using tools like multimeters, oscilloscopes, and spectrum analyzers.
- Soldering and Desoldering: Using soldering irons and related tools to attach and detach components on electronic devices. This requires expertise in handling different types of components and soldering techniques.
- Printed Circuit Board (PCB) Manufacturing: Operating machines that etch, laminate, drill, and route PCBs. This involves working with specialized equipment and materials for creating custom circuit boards.
- Electrical Panel Fabrication: Using tools to cut, shape, and mount components on electrical panels. This is crucial for building control panels used in various industries.
- Machine Calibration and Maintenance: Performing routine calibration and maintenance on equipment used in the electro industry sector. This ensures that machines operate accurately and efficiently.
- Automated Production Line Operation: Operating machines and robotic systems in an automated production environment, ensuring smooth operation and troubleshooting any issues.
- Power Tool Operation: Using power tools like drills, saws, and grinders to work on electrical enclosures, cabinets, and other components.
- Electrical Equipment Installation: Using tools to install electrical systems, such as lighting fixtures, switches, outlets, and control panels.
- Safety Compliance and Quality Control: Ensuring that machines and tools are operated safely and that the products meet quality standards and specifications.

It's important for professionals in the electro industry sector to have a good understanding of electrical principles, safety protocols, and the specific machines and tools relevant to their

tasks. Additionally, staying updated with the latest advancements in technology and equipment is crucial for maintaining efficiency and competitiveness in the industry.

3. Methodology and Analysis of company survey

The aim of the Factcheck program is to adapt vocational education and training to the needs of the labor market in the construction sector and in particular in the electrical industry sector.

In order to find the needs of the labor market as well as to highlight the qualitative and quantitative characteristics, and the shortcomings of professional education, a survey was designed which is addressed to workers and companies in the field.

The general structure of the survey was designed to collect specific information such as:

- Background information about the company
- Information of the answering person due to VET-themes
- Relevant occupational profile
- Occupational-based tasks (guided by Industry 4.0)
- Fitting industrial demands
- Digitalisation in the company

Companies from five different European countries took part in the research (30 per country), with the aim of creating a representative sample that will reflect the situation in the European electrical industry.

For the collection of the above information, a questionnaire of 16 questions was designed and created, properly structured, with simple and clear wording and with answers in the form of multiple choices, so that each respondent could answer quickly and accurately to the subject of each question.

The survey questions were designed in such a way that the questions we ask are clearly answered in order to facilitate the subsequent processing and analysis of results.

The method chosen for publicizing the questionnaire and collecting the information was the online survey, through the program page and sending the online address by email to each interested party. This research modality was chosen because online surveys offer tremendous advantages such as convenience, anonymity, cost-effectiveness, broad reach, cost-effectiveness, and their ability to reach a large and diverse audience.

Surveys of this type are conducted through web-based software platforms or via email, allowing participants to respond immediately and at their own convenience from anywhere in the world in real time.

At the end of the survey, the results were exported in Excel format and sent to the partners of the program for further processing and analysis. Each partner, after corresponding processing, created graphical representations for each question, in which the results of the

answers are illustrated. In this way, the analysis and presentation of the results at national level was achieved.

In order to have the results of the survey at a European level, after the national analyzes that were done on the questionnaires, an overall analysis of the results was done and in the same way graphs were created that refer to the totality of the answers to each question.

3.1 Concept of the Survey

Understanding the specific needs and requirements of the labor market is crucial in developing effective training programs that produce skilled professionals.

To achieve this, a comprehensive survey has been designed by FactCheck program, to gather information from workers in relevant companies in the field of electo industry.

As part of the survey, companies are asked to provide background information that provides a holistic view of their operations. This includes details about the size of the company, the nature of their business, the number of employees, and their strategic objectives. By understanding the company's profile, a clearer picture can be formed regarding the specific challenges and opportunities they face in the labor market.

Gathering information about the answering person is important to ensure that VET programs are tailored to the needs and expectations of those actually working in the industry. This includes understanding the individual's level of education, their previous training experience, and their job role within the company. By collecting this data, educational institutions can gain insight into the current knowledge and skills possessed by workers, identifying gaps and areas for improvement.

Examining the relevant occupational profile helps to determine the specific skills and competencies required for various job roles within the construction and electrical industry. Identifying the key tasks and responsibilities of different occupations enables VET providers to structure their programs accordingly, ensuring that graduates are equipped with the essential skills to excel in their chosen field.

With the advent of Industry 4.0, technological advancements have significantly transformed the construction and electro industry sector. It is important to gather information from workers regarding the impact of automation, artificial intelligence, and digitalization on their daily tasks and responsibilities. Understanding how these technologies are influencing job roles allows VET programs to integrate relevant training modules that prepare individuals for the evolving industry landscape.

In order for VET programs to be effective, they must align with the demands of the industry. This section of the survey focuses on capturing information about the specific requirements and expectations of companies when hiring new graduates or upskilling existing employees. By gauging the industry's demands, training programs can be designed to meet the needs of employers, ensuring that graduates are job-ready upon completion of their education.

Digitalization has become a driving force in the construction and electrical industry, revolutionizing processes and workflows. The survey explores the extent to which companies have embraced digitalization and the technologies they have implemented in their operations.

This information allows educational institutions to tailor their programs to incorporate relevant digital skills, ensuring that graduates are equipped to thrive in a digitalized working environment.

As a conclusion, the concept of a survey is invaluable in shaping vocational education and training to meet the needs of the labor market. By collecting specific information about companies, individuals, occupational profiles, tasks, industry demands, and digitalization, educational institutions can develop programs that produce skilled professionals who excel in the construction and electrical industry. The survey acts as a crucial tool in bridging the gap between education and the evolving demands of the labor market, ultimately benefiting both workers and employers.

3.2 Known Properties

As part of the survey, participants were required to provide basic information about their company. This includes details about the company's size, its specific focus on the electro industry, and any particular challenges or goals it faces. This information helps provide a comprehensive understanding of the context in which the company operates.

The survey also collects information about the respondent's VET subjects and their relevant professional profile. This helps identify the specific training needs and requirements of individuals in the electrical industry. By collecting data on participants' skill sets, qualifications and experience, the Factcheck project can suggest changes and improvements to vocational education and training programs to effectively address these needs.

One of the main thrusts of the research is to identify the occupational tasks in which people in the electrical industry are involved. The emergence of Industry 4.0 has brought significant changes to the way work is carried out in various sectors, including the electrical industry. By understanding these tasks, the Factcheck project can ensure that VET programs are up-to-date and aligned with the latest industry practices and technologies.

To keep up with the rapidly changing demands of the construction sector, it is important that VET programs are responsive and adaptable. The research carried out by the Factcheck project seeks to gather information about the specific industrial requirements in the electro industry sector. By identifying these requirements, VET programs can be modified to equip individuals with the necessary skills and knowledge required by employers.

Digitization has changed the game in almost every industry, including the electro industry sector. Factcheck's research focuses specifically on understanding the extent of digitization within companies. This includes collecting data on the adoption of digital tools, processes and technologies. This information helps assess the current digital landscape in the electrical industry and enables VET programs to integrate relevant digital skills into their curriculum.

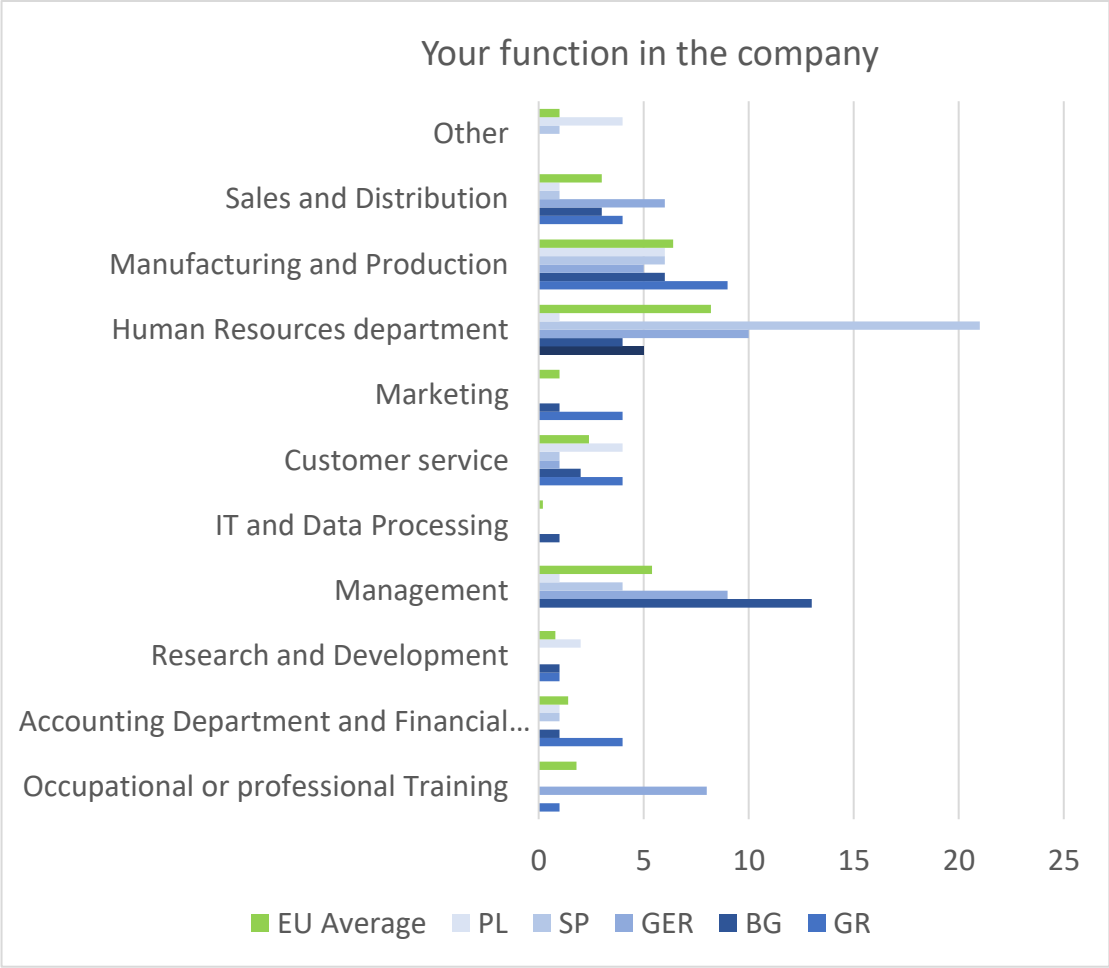
The results of the Factcheck project will produce important findings that will help bridge the gap between vocational education and labor market needs, particularly in the construction sector and the electrical industry. By conducting research and collecting specific information about companies, professional profiles, professional tasks, industrial requirements and digitization, the Factcheck project examines and informs whether VET programs are adapted to meet the evolving needs of the industry. This collaboration between education and industry

helps create a skilled workforce that can successfully address the challenges of the electrical industry, thereby benefiting both individuals and the industry as a whole.

3.3 Analysis of company feedback

Questions one and two were two introductory questions concerning the name of the company and the company profile that corresponded to the European classification, characteristics that are not necessary to draw conclusions that were needed in the research and thus are omitted from the present report.

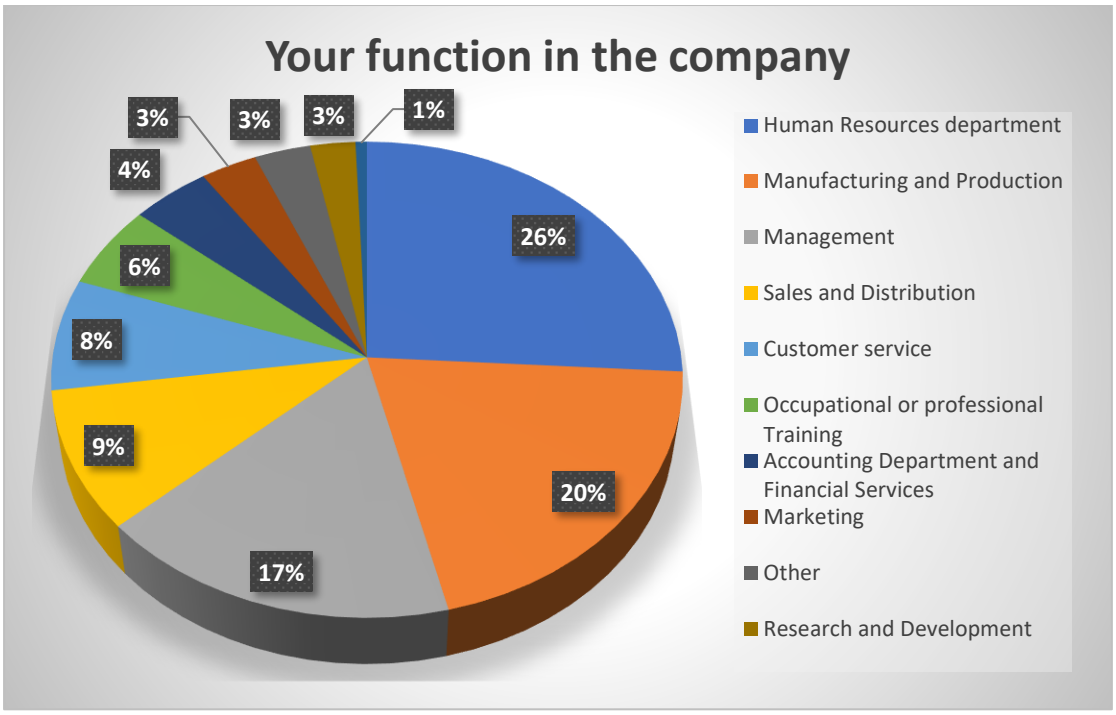
Question number 3



It was important to give the opportunity for employees working in all different departments of the companies to took part in the survey. This, as can be seen from the data collected and presented above, has been done with great success.

Human Resources (HR) department have the largest percentage of survey participants with 26%, followed with the second highest percentage the Manufacturing and Production

department witch represents 20% of the participants. Following the Management department with 17%, Sales and distribution with 9%, Customer Service with 8%, Occupational or professional Training with 6%, Accounting and Financial Services with 4% and Marketing with 3%



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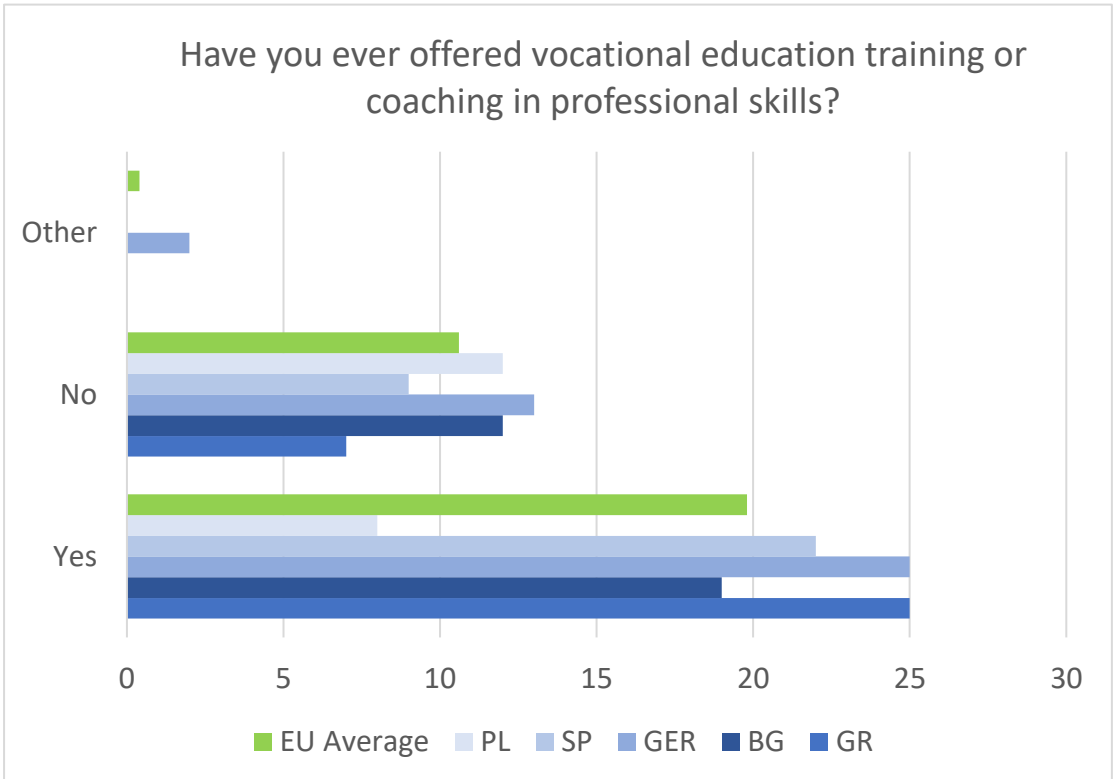


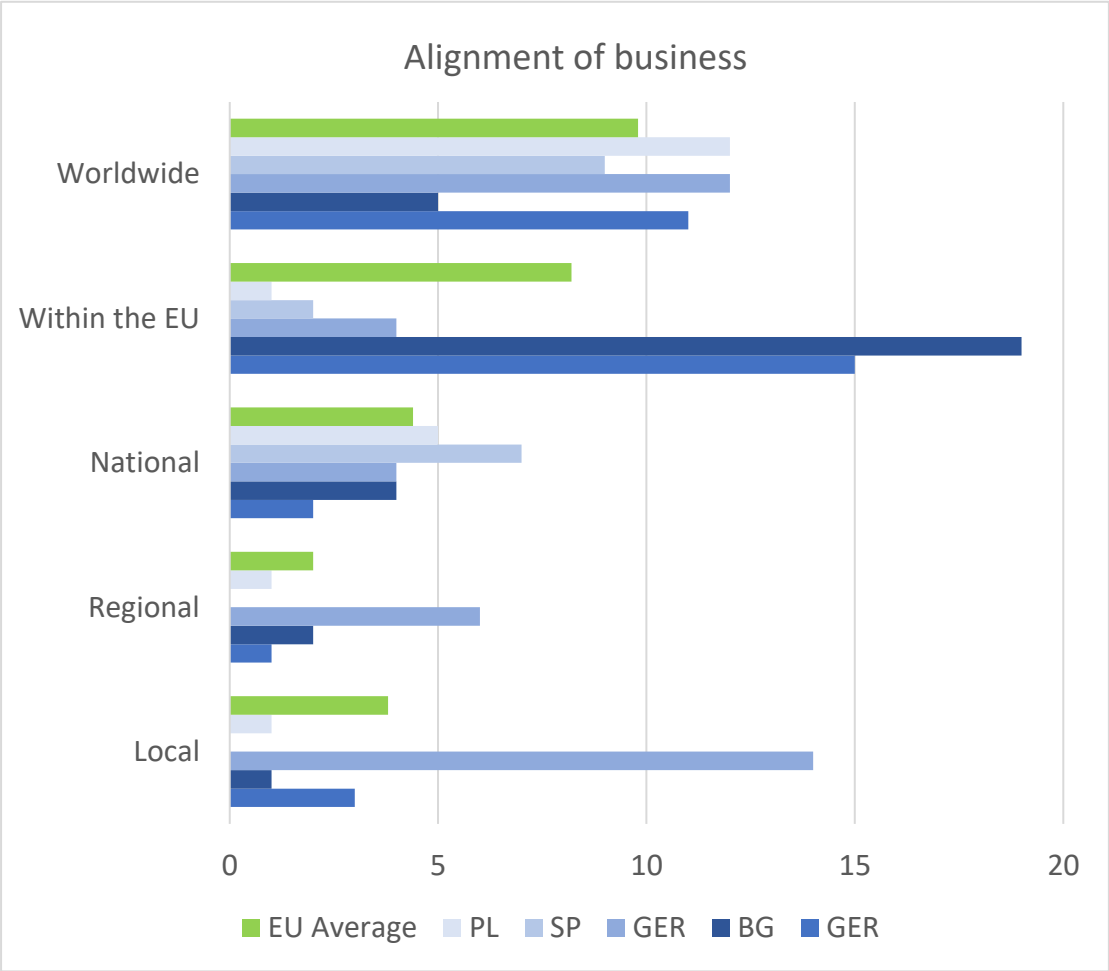
The FactCheck project through the survey took part at the companies of the electro sector attempts to bring out the level of vocational education training and coaching in professional skills.

In the question asked to the workers if they have ever been offered vocational training or guidance in vocational skills the majority of workers answered "Yes" at a rate of 64%. This large percentage of positive responses shows the importance that companies and employees attach to vocational training or guidance in vocational skills.

A smaller percentage of the class of 35% of workers responded "No", shows that many workers still do not have access to training or vocational education.

Only 1% of the respondents belonged to the "Other" category. This could include people who have received informal or non-traditional forms of vocational training.

Question number 5



FactCheck project, through the results of the survey, wants to examine the alignment of businesses at different geographic levels and the geographic scope of their activities, from local to global.

With this question employees asked to indicate the extent to which their business aligned with different geographies, including local, regional, national, intra-EU and global.

The survey reveals that the largest percentage of businesses (35%) prioritize alignment with global markets. Global alignment allows companies to network with customers and explore new opportunities on a global scale. Through new technologies and modern communication platforms, reaching customers in different parts of the world has become more accessible than ever and opens up new horizons.

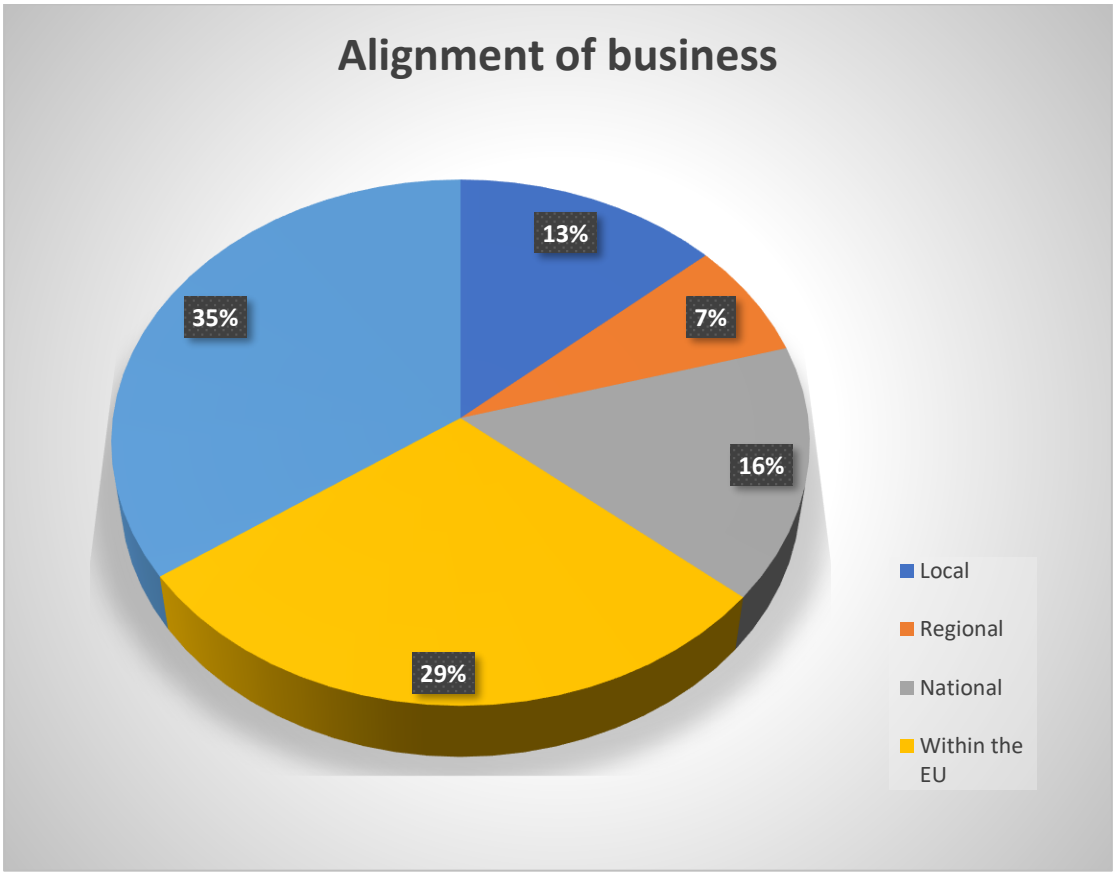
A percentage of 29% of companies focus on their alignment within the European Union (EU). This alignment strategy allows organizations to benefit from the economic and regulatory framework provided by the EU. Through a diverse but interconnected market, businesses can reap the benefits of the free movement of goods, services and capital within the EU.

A smaller percentage of businesses (13%) are locally aligned. This shows that some companies still recognize the importance of meeting the specific needs and preferences of local markets and are oriented towards them, despite the high level of market globalization.

On the other hand, alignment at regional, national or intra-EU level allows businesses to benefit from greater market opportunities.

Only 7% of the companies surveyed focus on the regional market. These companies understand the importance of expanding beyond local borders and tapping into a wider customer base.

While regional alignment is relatively low, a significant proportion of companies (16%) are nationally aligned, indicating the importance of domestic markets. By expanding their reach across the country, companies can access a larger consumer base and tap into different customer preferences.



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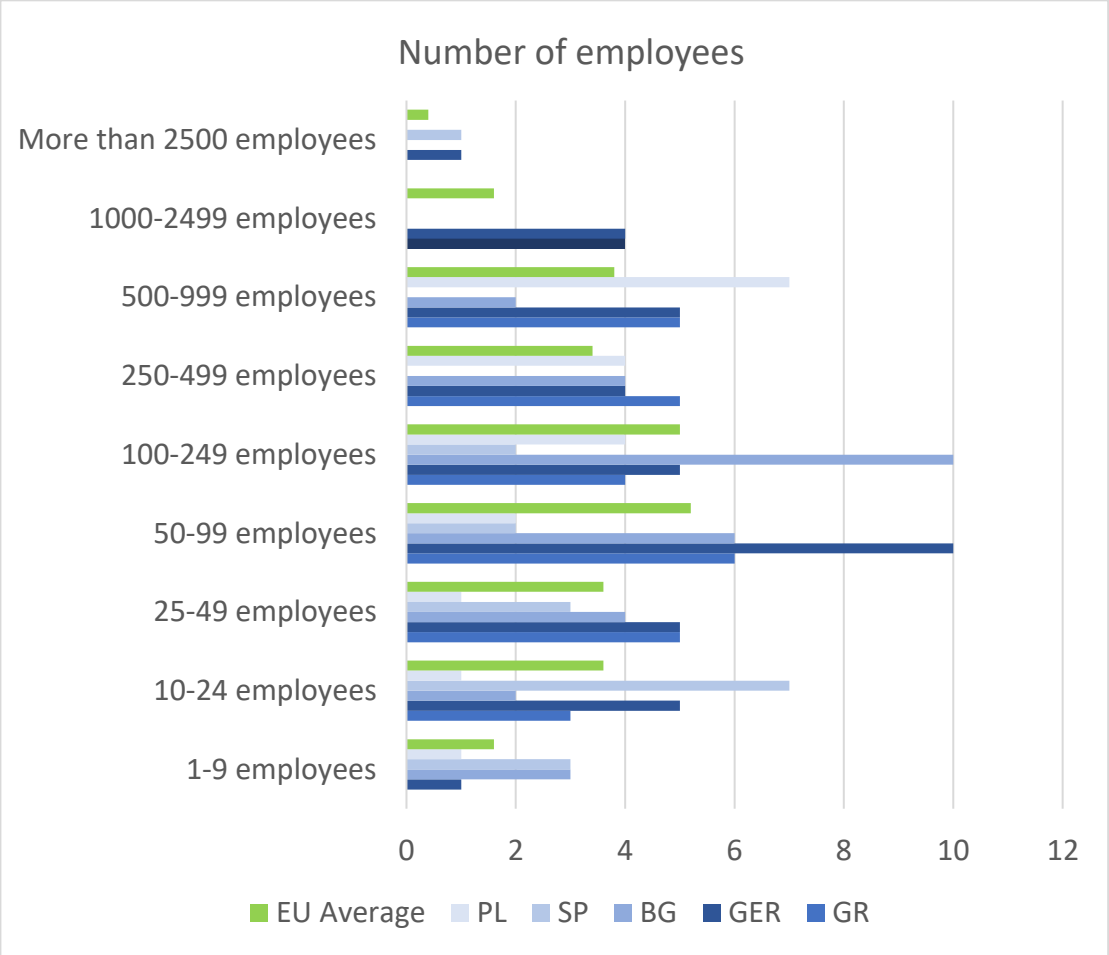


The number of employees of the companies that took part in the survey provides valuable information about the size, structure of the companies and their impact on the economy.

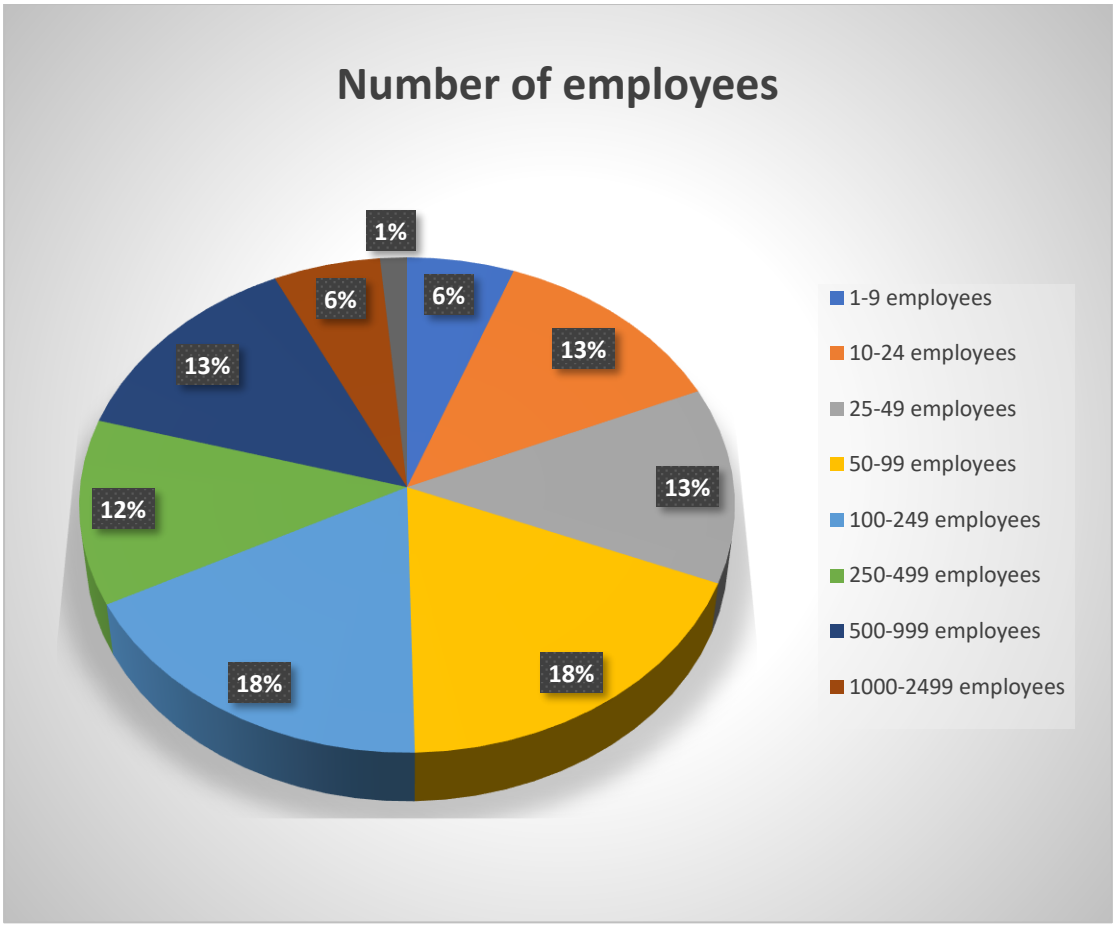
The results of the survey showed that the largest percentage of companies that participated ranged between 50 and 99 employees. This level includes small and start-up businesses that usually have a limited workforce but play a vital role in the economy. The first five categories together represent 68% of the companies that participated in the survey, highlighting the important position of small and medium-sized enterprises (SMEs).

Although small companies make up the majority of respondents, the data also reveals the presence of a significant number of larger companies. The categories 100 to 249 employees, 250 to 499 employees and 500 to 999 employees make up a total of 43% of the sample. These are companies that operate on a larger scale and often have a greater impact on the labor market.

Companies with more than 2500 employees are relatively rare, representing only 1% of all companies of the survey. These companies are usually huge corporations known for their extensive reach and significant influence in the global market.

According to the research, the employees of the electro sector are distributed in companies with different capabilities and size, which reflects the diversity and dynamics of the labor market.

The research highlights the key role of small and medium-sized companies in the economy and shows how important it is to support and nurture these companies, as they contribute significantly to job creation and innovation. Also the presence of larger companies indicates the need for policies that encourage the growth and sustainability of companies that play a vital role in the economy.



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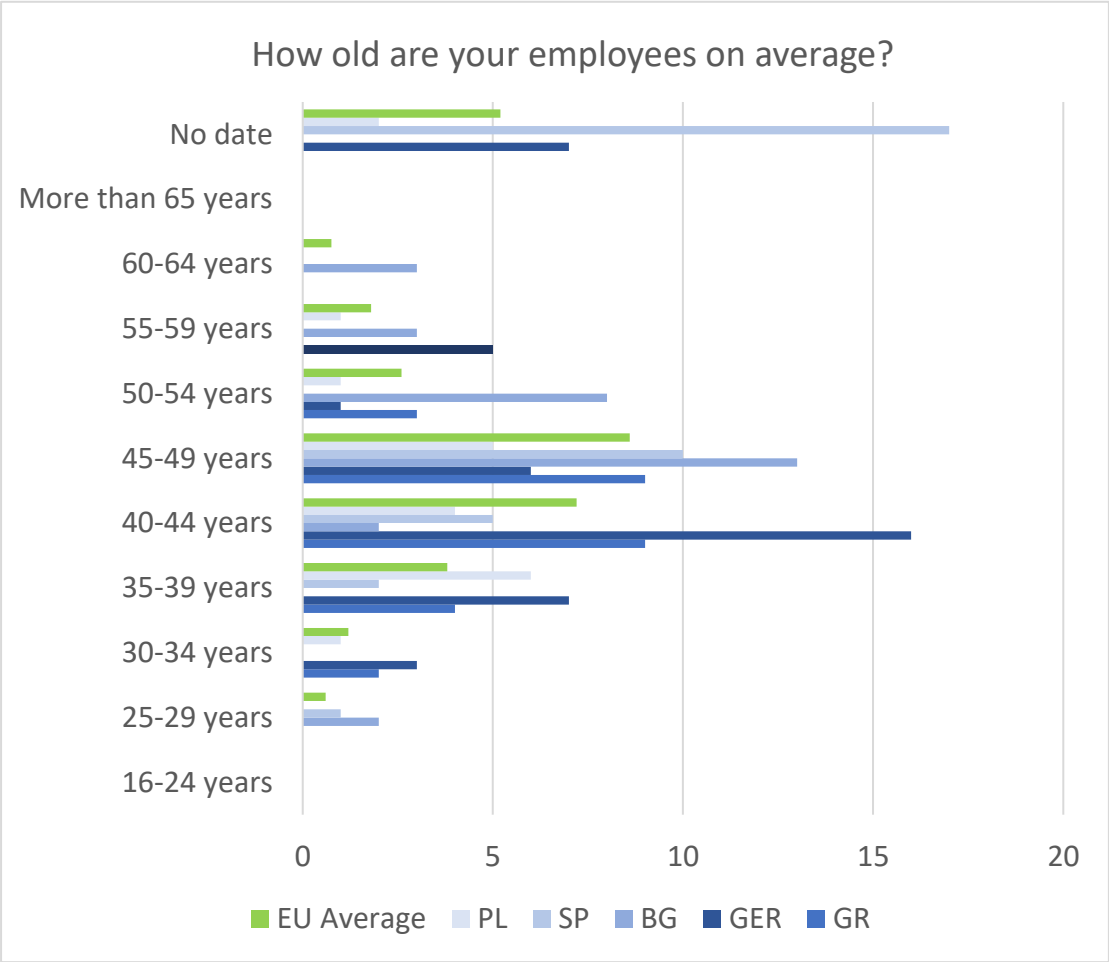


Collecting and understanding the demographics of workers in the metal industry is essential. Knowing the average age of your workforce can provide valuable insights into factors such as employee retention, training needs and industry dynamics.

According to the research carried out through the FactCheck project, data was collected on the age distribution of employees in different age groups. The survey respondents represented a wide range of industries and companies in Europe. Below are the results of the research as they are structured by age groups of employees.

Workers in the 45-49 age group represent the largest proportion, making up 27% of the workforce. This age group usually includes experienced workers who have acquired extensive knowledge and expertise in their subject matter, which could prove invaluable for running the business as well as mentoring younger workers.

The 40-44 age group amounts to 23% of employees. These individuals are also likely to have significant professional experience. They are the link between senior and junior employees, providing valuable knowledge while maintaining an outlook for new ideas and development.

Workers aged 35-39 make up 12% of the workforce. This group represents individuals who are likely to be at a pivotal stage in their careers, seeking opportunities for career

advancement and growth. Recognizing the unique needs and aspirations of this age group can help engage and retain employees.

The results of the survey show that 8% of the employees fall into the 50-54 age group. These workers have likely accumulated a wealth of knowledge and experience throughout their careers. Utilizing their expertise and skills can contribute to providing different perspectives within the company.

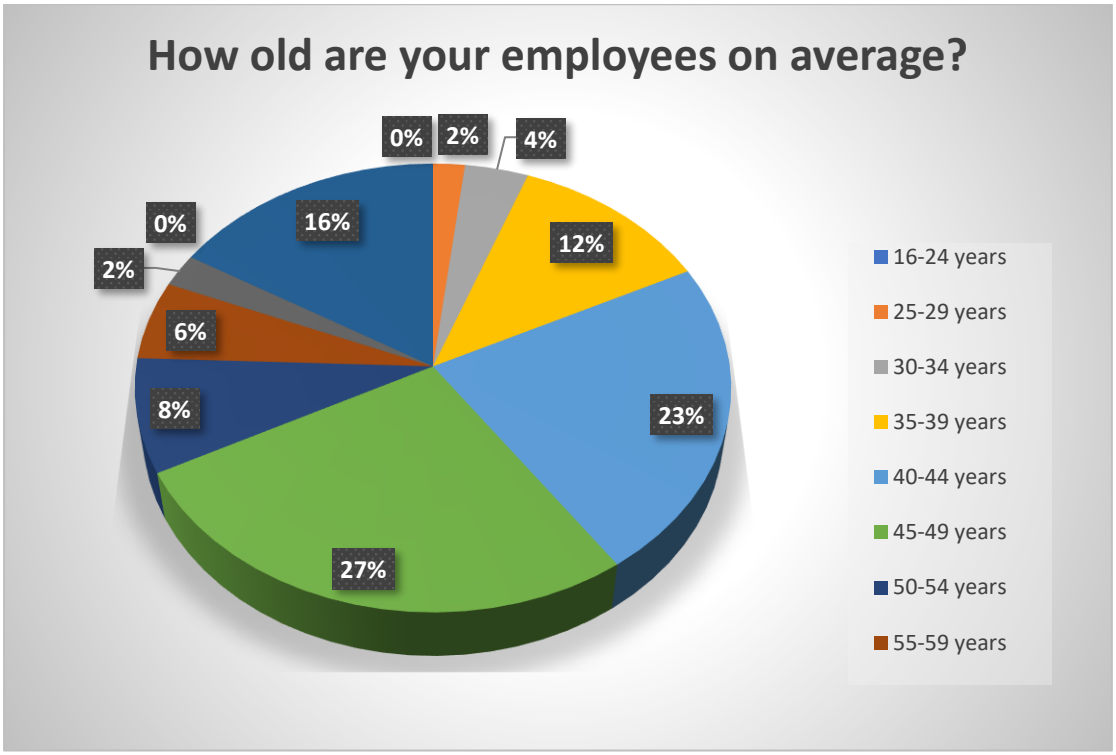
Workers aged 55-59 make up 6% of the workforce. This age group often represents a transition period where workers may begin to consider retirement options. It is important for employers to begin their succession planning and leverage the wisdom and experience these employees have gained over the course of their careers.

About 4% of employees are between 30-34 years old. This younger workforce can bring fresh perspectives and innovative ideas to the industry. Creating opportunities for growth and development can help retain talent and foster a dynamic work environment.

Workers aged 60-64 make up a small percentage, representing only 2% of the workforce. These individuals may choose to continue working or choose to retire at this stage. Recognizing their value and providing flexible work arrangements can help preserve their expertise while respecting their personal preferences.

Accordingly, the 25-29 age group represents another 2% of the workforce. These workers often bring energy and enthusiasm to the workplace. Offering education and training programs and opportunities for development can help realize their potential and nurture new talent.

Also, the survey did not identify respondents in the 16-24 age group, as well as workers over 65 years old. Surprisingly, 16% of respondents did not provide information on the age of their employees.



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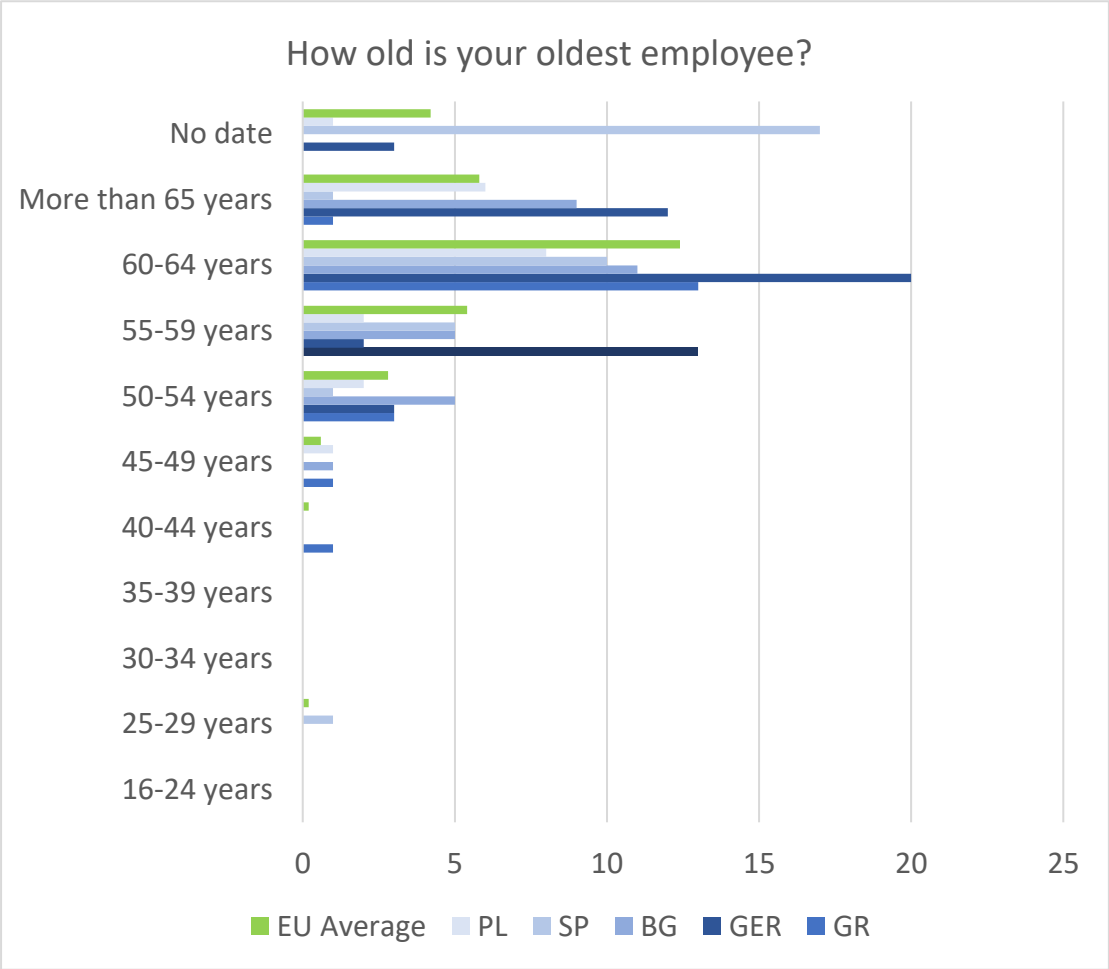


Survey results revealed that the majority of companies, comprising 40%, have their oldest employee between the ages of 60-64. This suggests that many companies value the expertise and experience of their older employees.

This is followed by 18% of the companies in which it is recorded that their oldest employee is in the over 65 category. This highlights a growing trend of people choosing to continue working beyond the traditional retirement age, contributing their knowledge and skills to the workforce.

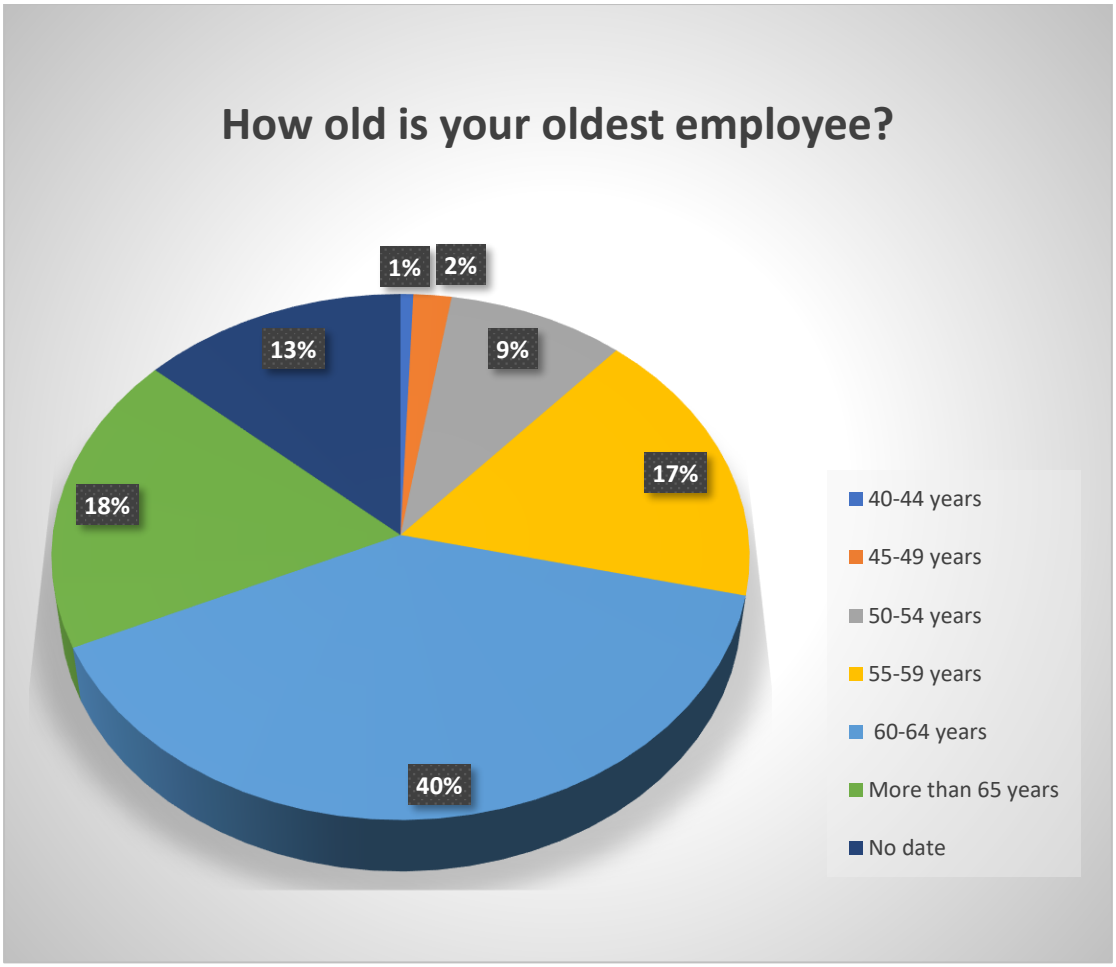
Other notable age groups included 17% of companies having their oldest worker in the 55-59 age group, highlighting the importance of this age group's contribution.

In addition, 9% of companies reported that the oldest employee was between 50-54 years old, demonstrating a continued presence of experienced individuals in the workforce.

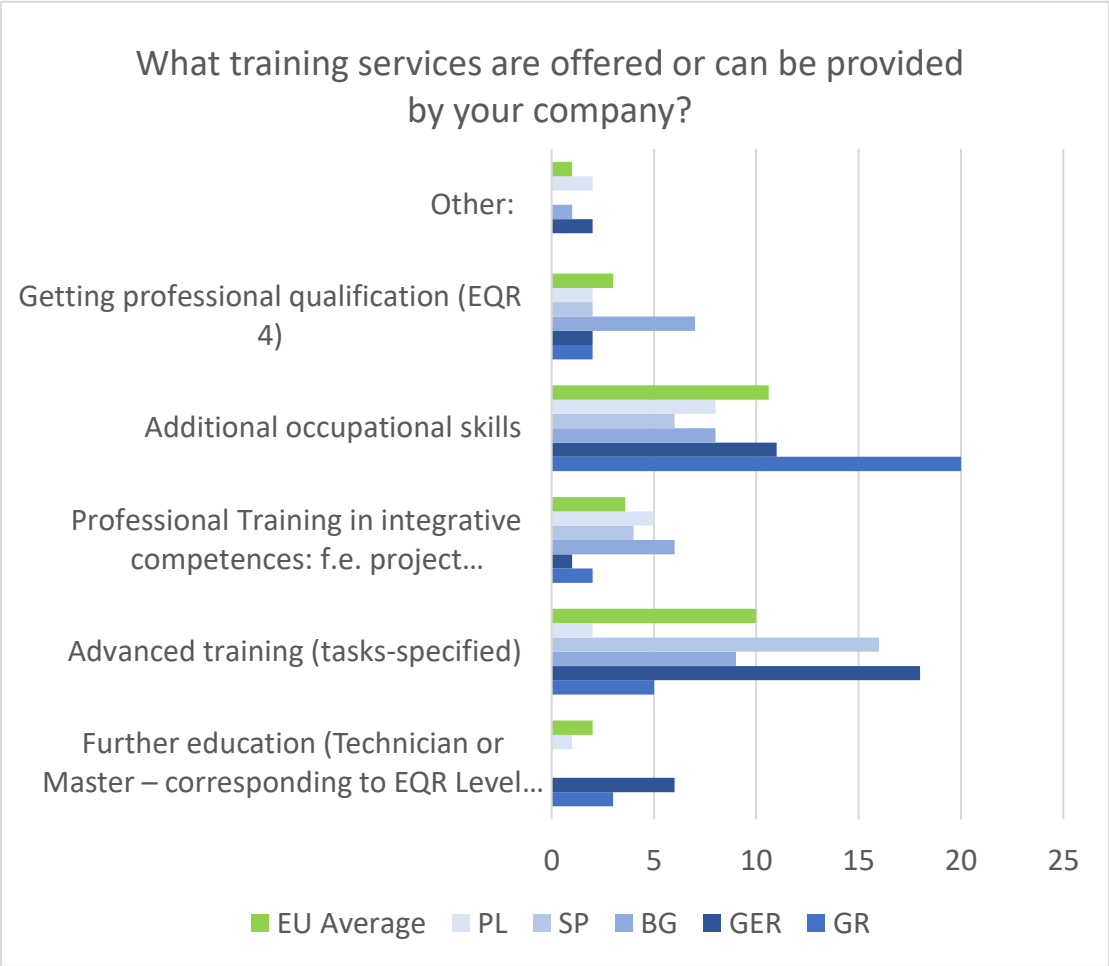
On the other hand, only 2% of companies had their oldest employee between the ages of 45-49 and 1% of companies had their oldest employee aged 40-44, indicating lower representation in this age group.

It is worth noting that younger workers also contribute to the workforce. Although the percentages may be relatively lower, 1% of companies reported having their oldest employee in the 25-29 age group, indicating the inclusion of younger talent in organizations.

Interestingly, 13% of respondents did not provide specific data, suggesting a need for better record keeping and data collection practices.



Question number 9



The aim of the survey was to explore the range of training opportunities available to workers and the importance placed on different types of training. The results show the various training programs that companies offer to enhance the skills and knowledge of their workforce. Here is an overview of the percentages for each category:

Additional Professional Skills - 35% : The majority of survey respondents recognize the importance of enhancing the professional skills of employees. Training programs in this category provide workers with additional skills that complement their primary job functions. By broadening their skills, employees become more flexible and capable of handling various tasks in their work area.

Advanced training (specified tasks) - 33% : More than a third of respondents prioritize advanced training that focuses on specific tasks or job-related skills. This type of training is tailored to the unique needs of each position in the company. By empowering employees in their specific roles, companies can improve operational efficiency and ensure competence in critical areas.

Vocational Training in Integrative Skills - 12% : About 12% prioritize training programs that cultivate integrative skills. These programs go beyond job-specific skills and focus on developing broader professional attributes such as leadership, teamwork, communication and

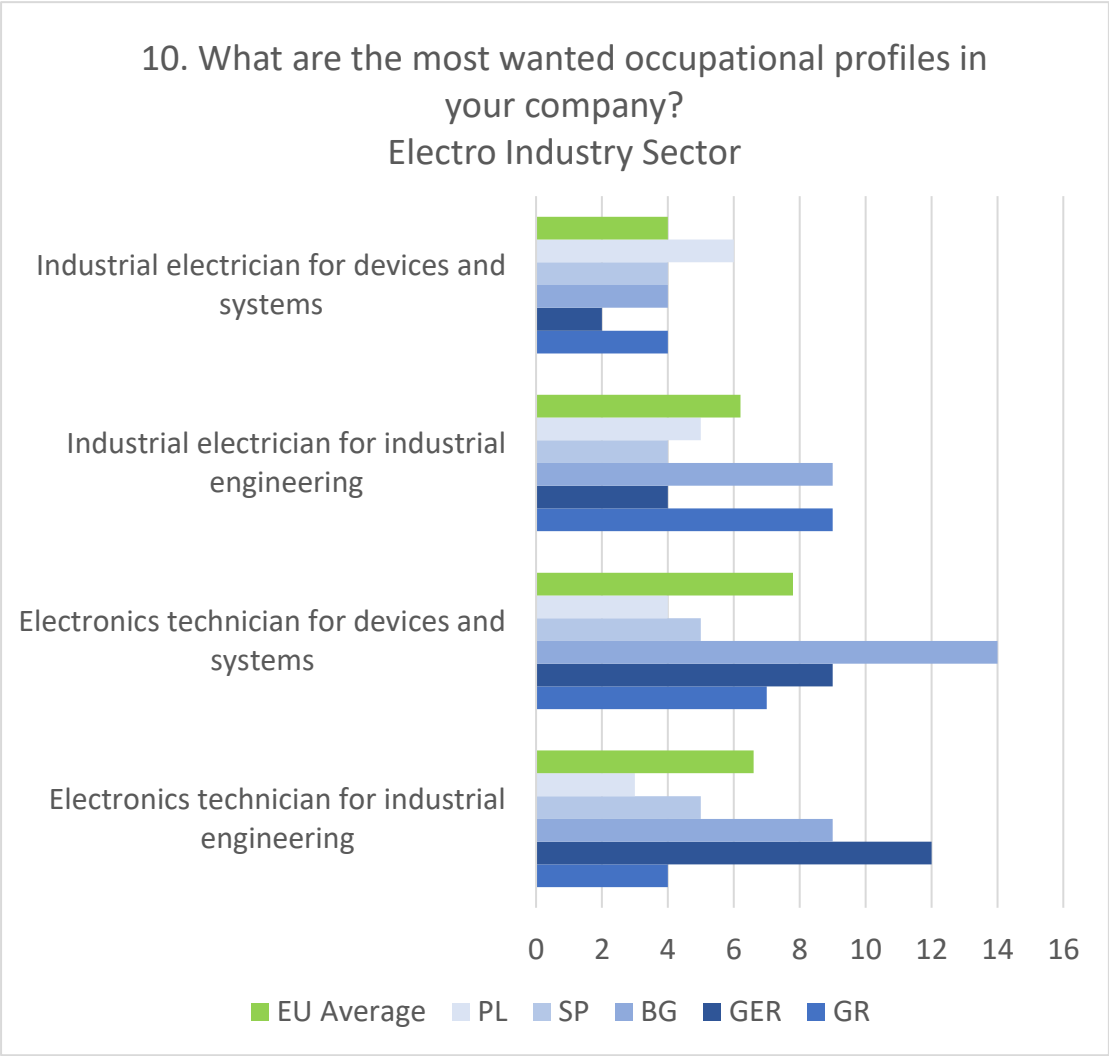
problem solving. Comprehensive competency training helps employees adapt to changing work environments and assume flexible roles within companies.

Obtaining professional qualifications (EQR 4) - 10% : A 10% share focuses on offering training programs that enable employees to obtain professional qualifications equivalent to the European Qualifications Framework (EQF) Level 4. These programs provide individuals with the necessary knowledge and skills to develop in their chosen field. By supporting employees in the pursuit of professional qualifications, companies demonstrate their commitment to individual development and industry standards.

Higher Education Qualifications (Technician or Master) - 7% : Companies recognize the value of continuing education and encourage employees to pursue higher qualifications. This category includes training programs that help people obtain Technician or Master level certifications, equivalent to the European Qualifications Framework (EQF) Level 6. By investing in further education, companies aim to enhance the know-how of their employees and support professional their development.

Other - 3% : A small percentage of companies provide additional training services not covered in the above categories. These training programs may address specific needs that are unique to the respective organizations or offer specialized certifications that have value in specific industries.

Question number 10



One of the goals of the FactCheck project survey was to find and highlight the most wanted professional profiles in the power generation industry, which is of great importance for professionals and companies operating in this sector.

Below are presented each professional profile with the percentage it received, according to the opinions of the employees who took part in the research.

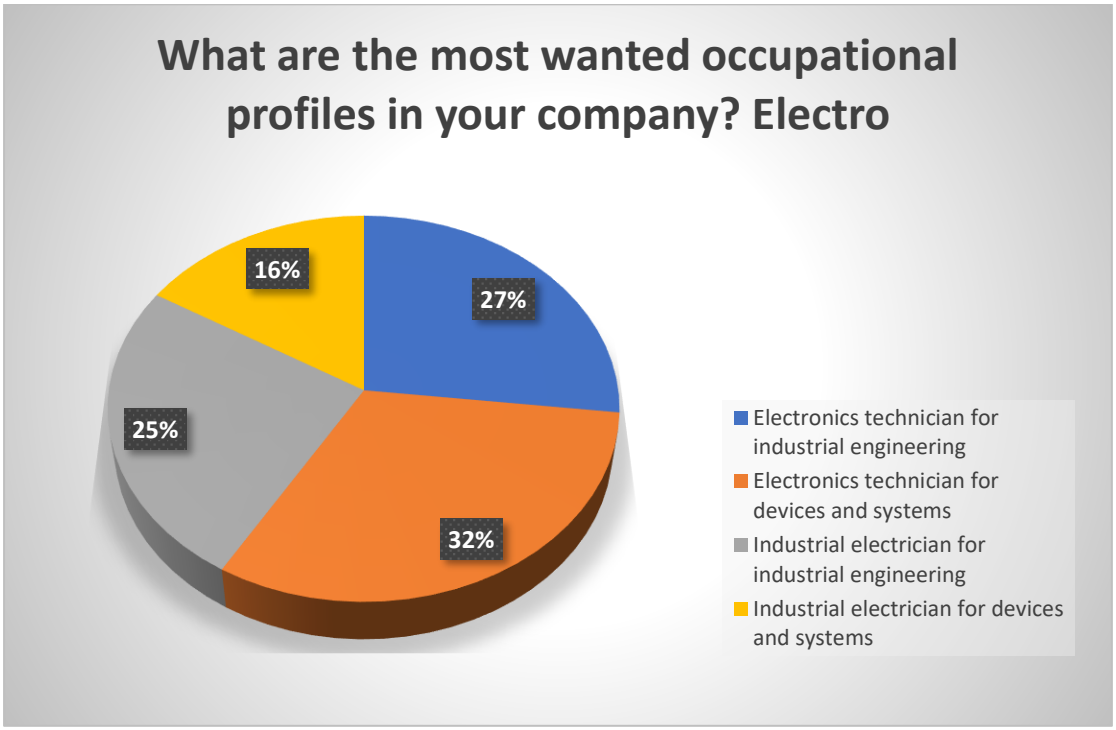
Electronics technician for devices and systems (32%): Electronics technician involves working with various electronic systems, from manufacturing and installation to troubleshooting and repair. These professionals play a crucial role in ensuring the functionality and efficiency of electronic devices and components. The results shows that companies are looking for qualified professionals in this field and the profile has a lot of perspective for the next years.

Electronics technician for industrial engineering (27%): Electronics technician plays a critical role in ensuring the smooth functioning of industrial machinery and equipment. They are involved in the installation, maintenance, and repair of complex electronic systems that

power various industrial processes. This includes automated control systems, robotics, and machinery utilized in manufacturing, quality control, and other industrial applications.

Industrial electrician for industrial engineering (25%): Industrial electrician is responsible for installing, maintaining, and repairing electrical systems in industrial settings. Their primary focus is on ensuring the safe and efficient operation of electrical equipment used in factories, manufacturing plants, and other industrial environments. This includes working with complex machinery and systems that require specialized knowledge and expertise.

Industrial electrician for devices and systems (16%): Industrial electrician specializing in devices and systems is responsible for installing, maintaining, and repairing electrical components in industrial settings. They work with a wide range of devices, such as motors, generators, transformers, switchgear, control panels, and more. These professionals are well-versed in interpreting electrical diagrams, schematics, and blueprints, allowing them to troubleshoot and identify issues efficiently.



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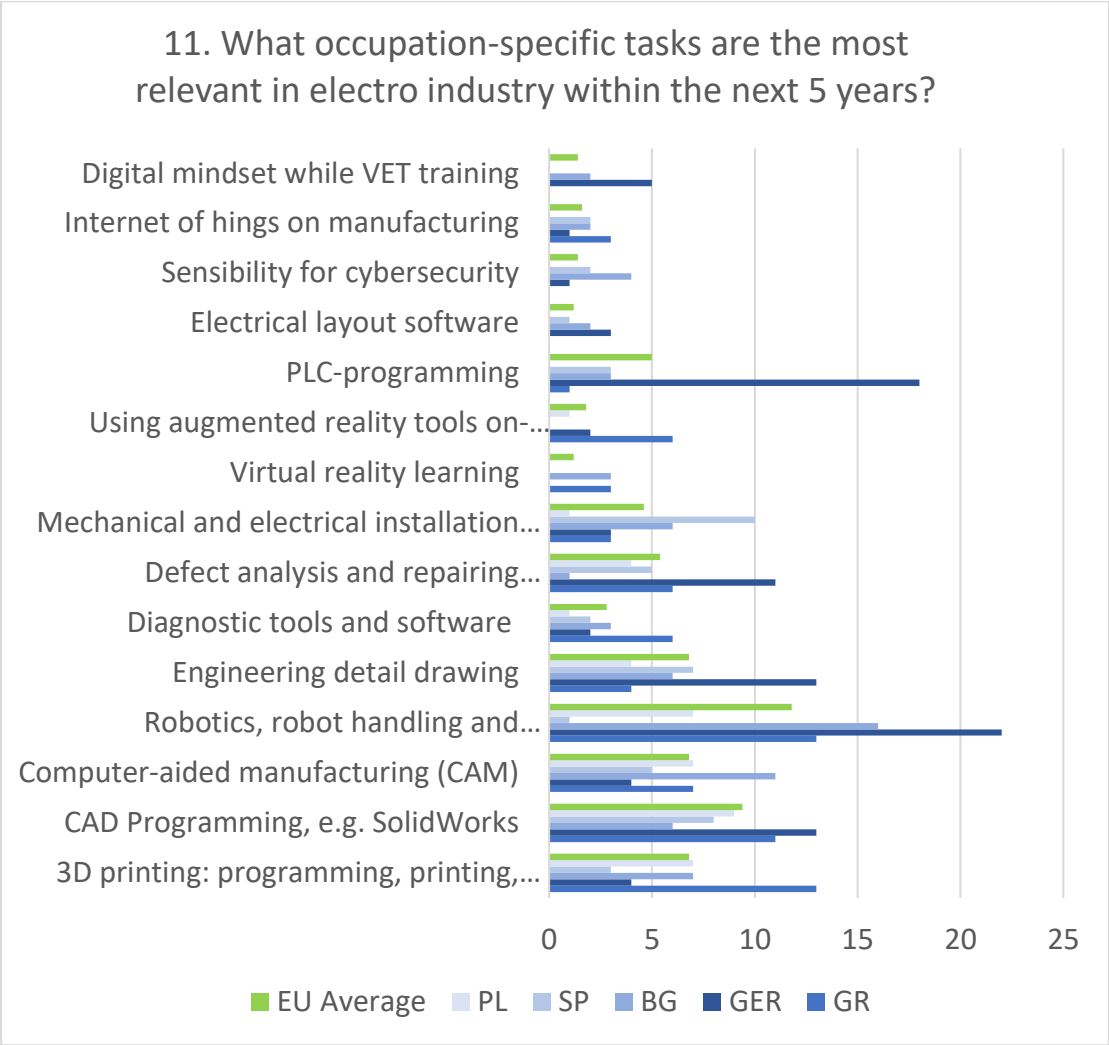


Robotics: Robot Manipulation and Automation (18%): Robotic technologies have revolutionized the metal industry by improving productivity and efficiency. So the ability to operate robots and understand their applications will be extremely important in the next five years. Companies will be looking for professionals who can effectively operate, program and maintain these advanced systems.

CAD programming (15%): Computer-aided programming (CAD) is a key skill set for designing and creating digital models of parts and products. As the industry increasingly incorporates digitization, professionals with expertise in CAD programming will be valuable in developing innovative and effective solutions.

3D printing (11%): 3D printing has gained enormous popularity in recent years. This technology enables the production of complex and customized parts, reducing waste and production costs. Consequently, people with knowledge of 3D printing will be in high demand to optimize production processes and drive innovation.

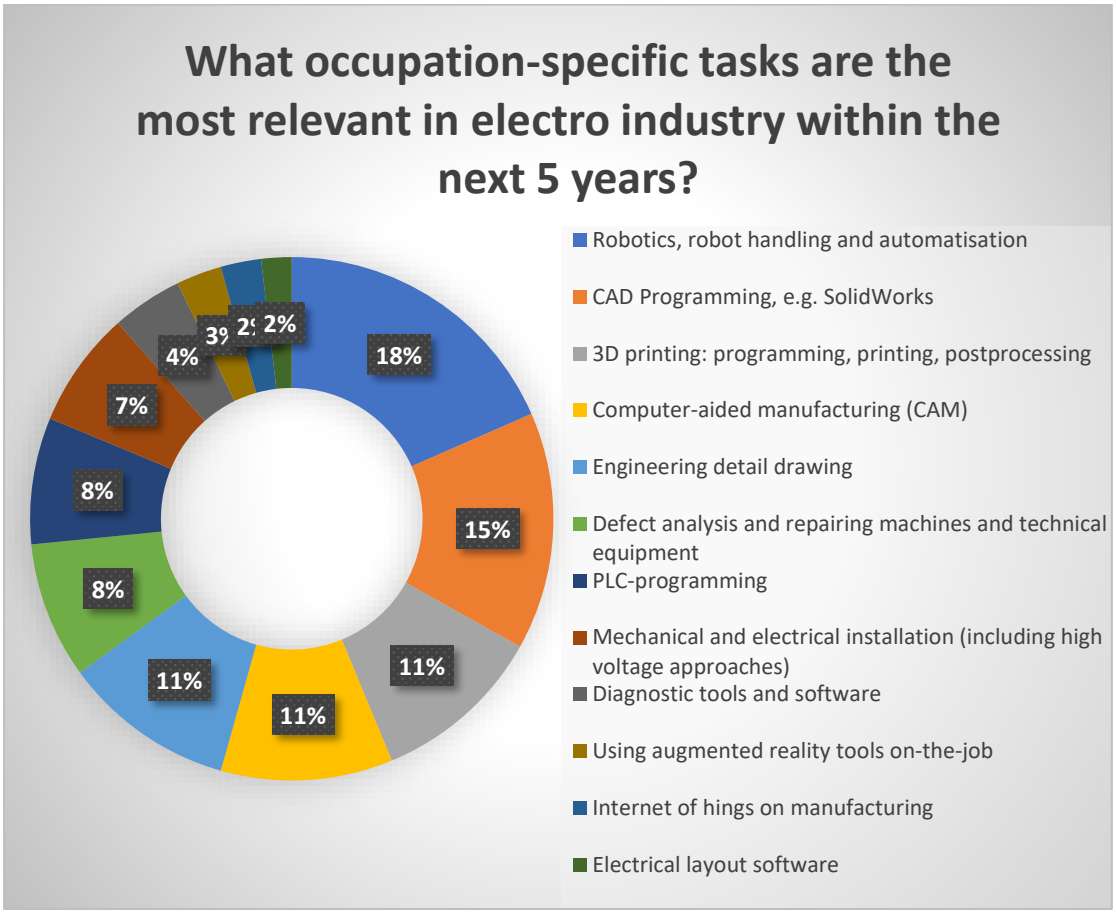
Computer Aided Manufacturing (11%): Computer-Aided Manufacturing (CAM) systems bridge the gap between design and production by automating various production processes.

Proficiency in CAM software and systems is necessary to achieve efficiency and accuracy in the electro industry over the next five years.

Technical Detail Design (10%): Accurate and detailed engineering designs are one of the most important sections of the electro industry. Professionals skilled in mechanical detail drawing will continue to be in demand, as these drawings serve as the basis for manufacturing processes and ensure accurate production.

Fault Analysis and Repair Machinery and Technical Equipment (8%): Maintenance of production equipment and detection and correction of defects are key tasks in the metal industry. Professionals with expertise in defect analysis and machine repair will play a vital role in ensuring uninterrupted production and optimizing performance.

PLC-Programming (8%): Programmable logic controllers (PLCs) are widely used in industrial automation systems to control various processes. As the metals industry moves toward automation, professionals skilled in PLC programming will be essential to the development and maintenance of these systems.



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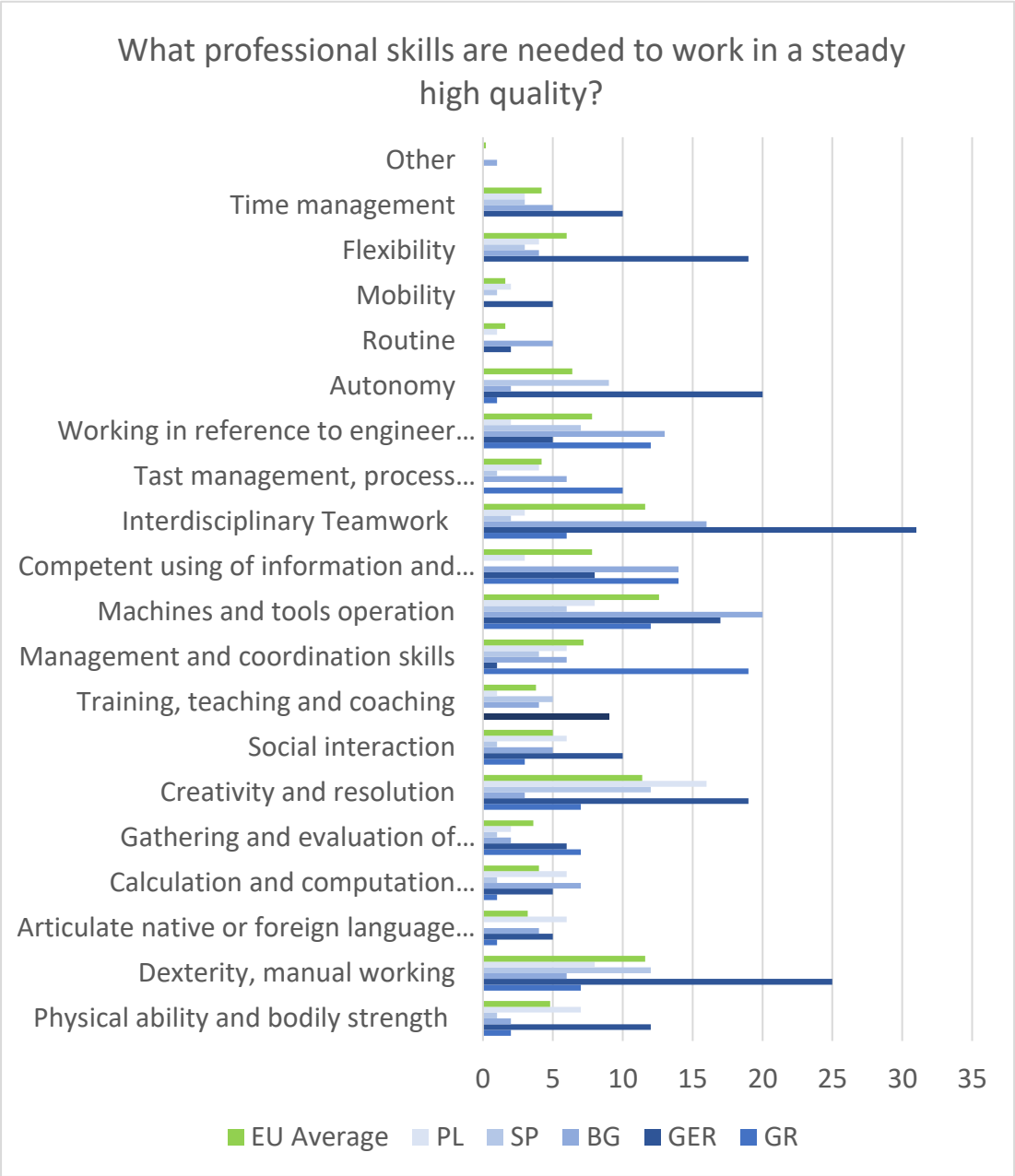

In the dynamic and ever-evolving electro industry sector, achieving and maintaining a steady high quality of work hinges upon a comprehensive blend of professional skills.

Operation of machinery and tools (12%): The electro industry relies heavily on machinery and tools to ensure smooth operations, efficient production, and optimal performance. These machines and tools, ranging from generators and transformers to automation systems and diagnostic equipment, require skilled individuals who possess the necessary knowledge and expertise to operate them effectively.

Dexterity - Manual Labor (12%): Manual dexterity involves the ability to perform precise movements with your hands or body. It is especially important in areas that require complex

operations, such as assembly lines. This skill ensures attention to detail and the ability to produce work of exceptional quality.

Interdisciplinary teamwork (12%): Interdisciplinary teamwork refers to the collaboration among professionals from different disciplines, working together to solve problems, streamline processes, and achieve common goals. This approach brings together individuals with varying skills, knowledge, and experiences, creating a dynamic environment for innovation and creativity.

Creativity and analysis (11%): The combination of creativity and analysis skill creates a powerful synergy that propels individuals towards success. Creative thinking enables individuals to generate innovative ideas, while analysis skill provides the tools to evaluate, refine, and implement these ideas effectively. Together, they form a dynamic problem-solving approach that balances imaginative thinking with critical evaluation.

Competent use of Information Technology and Communications (8%): In today's digital age, effective use of information and communication technology (ICT) is vital in various industries. The ability to use profession-specific software, tools and platforms enhances productivity, accuracy and the delivery of high-quality work.

Work in relation to engineering standards, technical guidance and legal compliance (8%): Many professions, such as engineering, require adherence to specific standards, technical guidelines and legal regulations. Working to these standards ensures the quality, safety and integrity of production. Professionals must have a deep understanding of these requirements and apply them diligently in their work.

Management and Coordination Skills (7%): Management and coordination skills refer to a set of abilities that enable individuals to effectively plan, organize, and control activities within a team or organization. These skills involve a combination of leadership, communication, problem-solving, and decision-making abilities.

Autonomy (6%): Autonomy refers to the ability to work independently and make informed decisions. Employees with strong autonomy skills can produce high-quality work by taking responsibility for their tasks and exercising good judgment throughout the process.

Flexibility (6%): Flexibility is a critical skill, especially in fast-paced industries or professions that require adapting to changing conditions. Quick adaptation to changes, and ease of learning, allows professionals to maintain a high level of productivity and quality despite fluctuating conditions.

Social interaction (5%): Social interaction skills refer to the ability to effectively communicate and engage with others in various social settings. These skills involve both verbal and non-verbal communication, active listening, empathy, and adaptability. They are essential for establishing and maintaining positive relationships, resolving conflicts, and navigating social situations with ease.

Physical ability and physical strength (5%): In some occupations, physical fitness and physical strength play an important role in providing high quality work. Having the necessary physical capabilities ensures efficient execution and optimal results.

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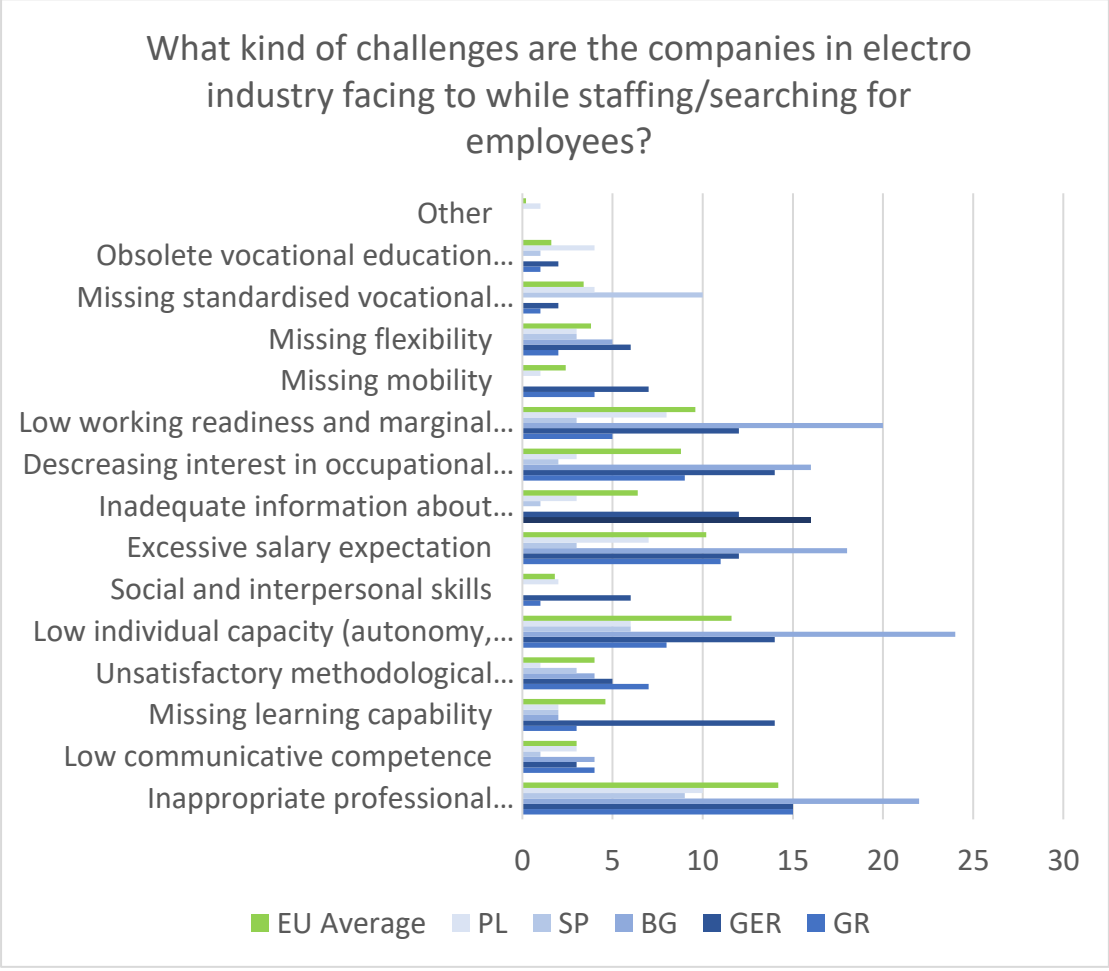


Companies in the electro industry face several challenges when it comes to staffing and finding employees. These challenges can significantly affect the productivity and efficiency of companies. The FactCheck project research evidence below helps identify and understand the nature of these challenges.

Inappropriate professional qualifications (19%): Companies often face the challenge of finding candidates who possess the necessary skills and knowledge. A lack of qualified candidates can significantly affect workforce productivity and efficiency.

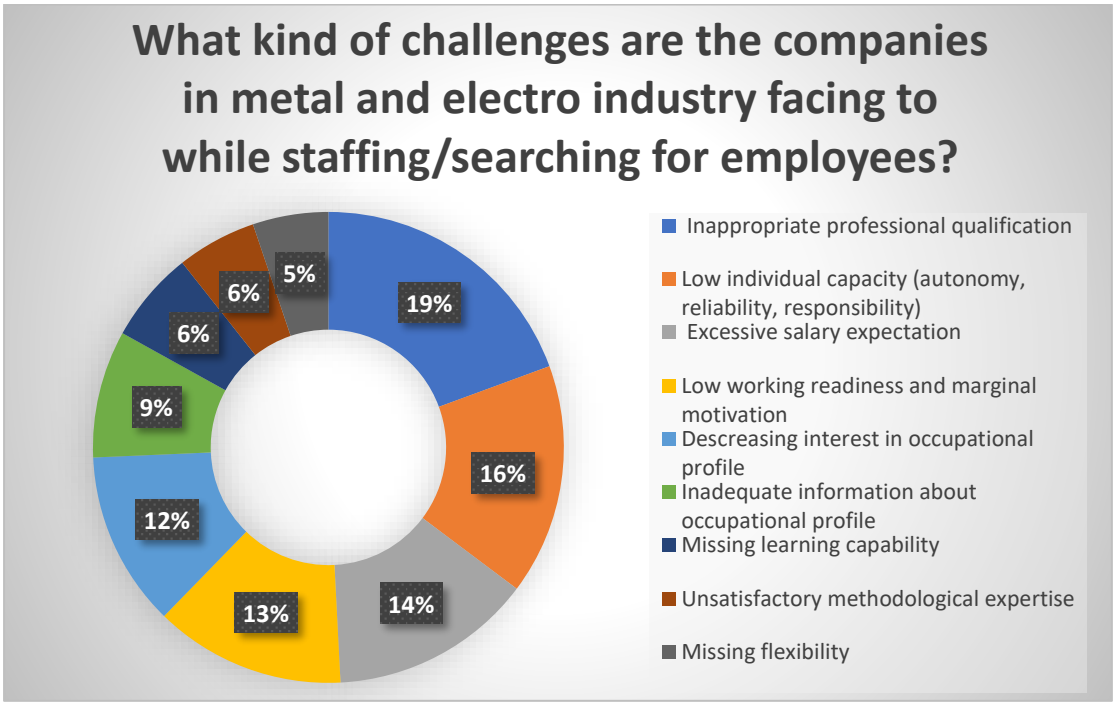
Low individual ability (autonomy, reliability, responsibility) (16%): Individual competence, including qualities such as autonomy, reliability and responsibility, contribute to the success of the metals industry. However, companies often face challenges in finding employees who possess these characteristics.

Excessive salary expectation (14%): Salary expectations can be a significant challenge for companies in the metals industry, as workers with high salary demands may not align with the company's budget or industry standards.

Low work readiness and marginal motivation (13%): Work readiness and motivation are essential for employees to perform their duties effectively and efficiently. Companies in the metal industry often face difficulties in finding people who are ready to work and highly motivated.

Reduced interest in professional profile (12%): The reduced interest in the professional profile is one of the challenges faced by companies in the metal industry. The industry needs to attract new talent to ensure a sustainable workforce in the new working environment that is taking shape.

Insufficient information on professional profile (9%): The metals industry has several specialized roles that may not be known or understood by job seekers. This lack of job profile information can make it difficult for companies to find candidates with the right skills and knowledge.



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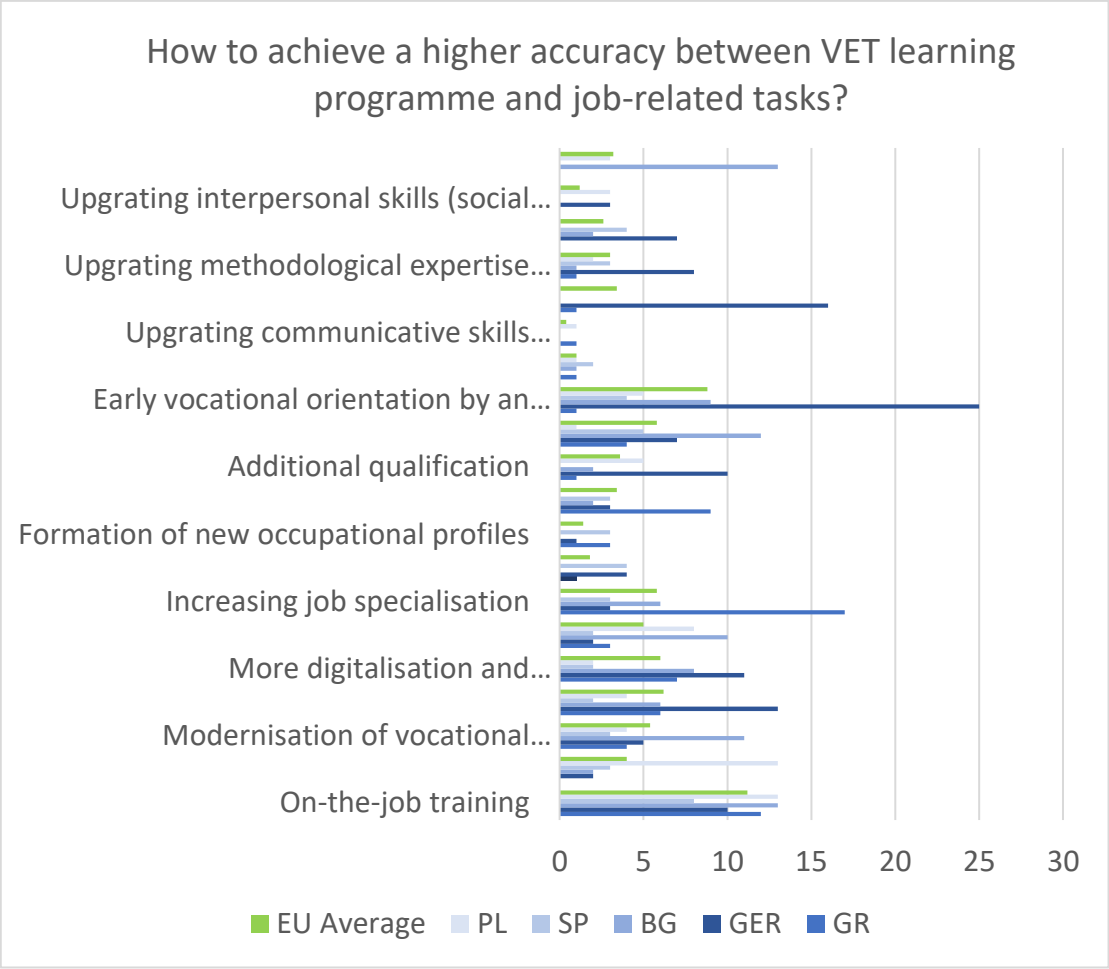


On-the-job training (21%)

One of the most effective ways to bridge the gap between VET learning programs and work-related tasks is through on-the-job training.

Early career guidance (16%)

To ensure a smooth transition from VET learning programs to work-related tasks, it is vital to provide early career guidance. This can be achieved through an appropriate information strategy and practical experience.

Trainer, coaches and teacher training (11%)

Investing in the training and professional development of trainers, coaches and teachers is crucial to improving the quality of vocational education and aligning it with work-related tasks.

Digitization and automation contents (11%)

With technological developments reshaping industries around the world, it is imperative for vocational education to integrate the contents of digitization and automation into their curriculum.

Increase in job specialization (11%)

As industries become more specialized, vocational education must adapt to meet these changing needs. By offering specialized training programs that focus on specific job roles or industries, VET programs can be more effectively aligned with work-related tasks.

Well-regulated exchange (11%)

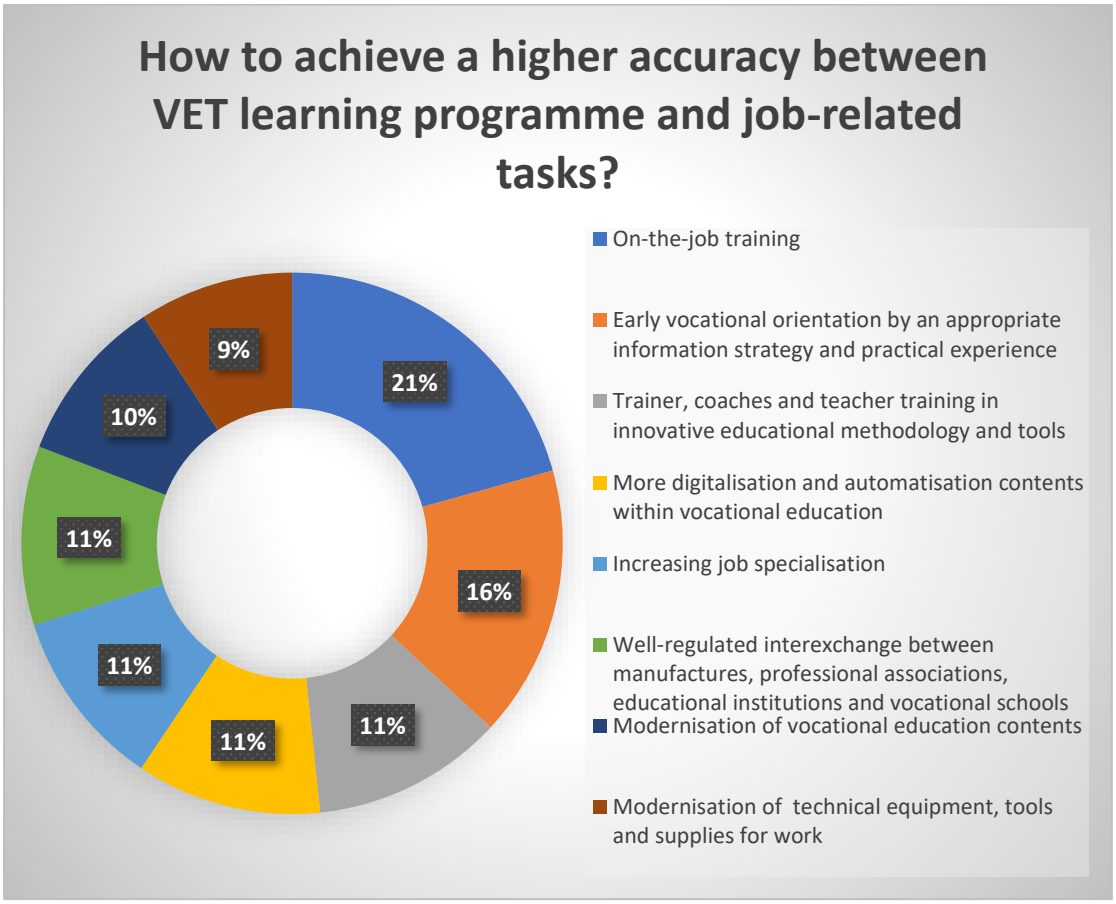
Facilitating well-regulated exchange between manufacturers, trade associations, educational institutions and vocational schools can significantly improve the accuracy between VET learning programs and work-related tasks.

Modernization of the content of vocational education (10%)

To achieve greater accuracy between VET learning programs and work-related tasks, there is a need for continuous modernization of vocational education content. This entails regularly reviewing and updating the curriculum to reflect industry trends, technological developments and emerging job roles.

Modernization of technical equipment and tools (9%)

In addition to updating the content of vocational education, the modernization of technical equipment, tools and supplies is equally important. As industries incorporate new technologies, it is vital for VET programs to provide students with access to state-of-the-art tools and equipment.



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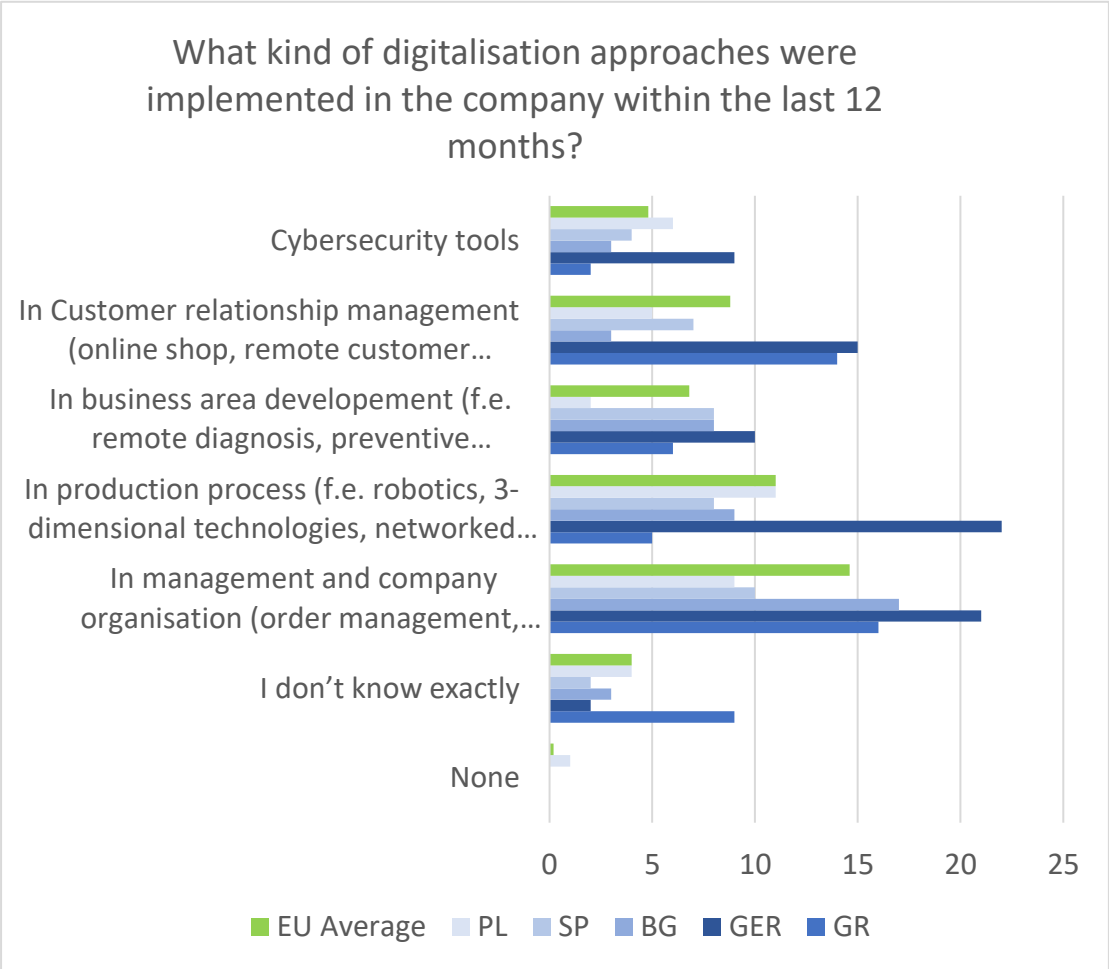


Company Management and Organization (29%)

Digitization in the context of Company Management and Organization refers to the process of incorporating digital technologies, tools, and strategies to enhance the efficiency, productivity, and overall performance of the company. This transformation often involves the integration of digital solutions into various aspects of management and organizational functions.

Implementing digitization in Company Management and Organization can lead to increased efficiency, reduced costs, improved decision-making, and enhanced overall competitiveness in the modern business landscape.

Production Process (22%)

Digitization in the production process refers to the integration of digital technologies and data-driven approaches to enhance and optimize various aspects of manufacturing. This transformation can significantly impact efficiency, quality, and overall performance of company.

Digitization of the production process enhances agility, flexibility, and competitiveness in today's rapidly evolving manufacturing landscape. It allows companies to adapt to changing market demands and gain a competitive edge in the global marketplace.

Customer Relationship Management (18%)

Companies have realized the importance of leveraging digital technologies to improve customer relationship management. With the advent of online stores, remote customer service and social media platforms, companies can now connect with customers on a whole new level. This allows them to provide personalized service, address concerns in a timely manner and build stronger relationships with their customers.

Business Space Development (13%)

Digitization has also paved the way for the development of innovative business space. Companies use technologies such as remote diagnostics, preventive maintenance and IT services to remain at high levels of quality and reliability.

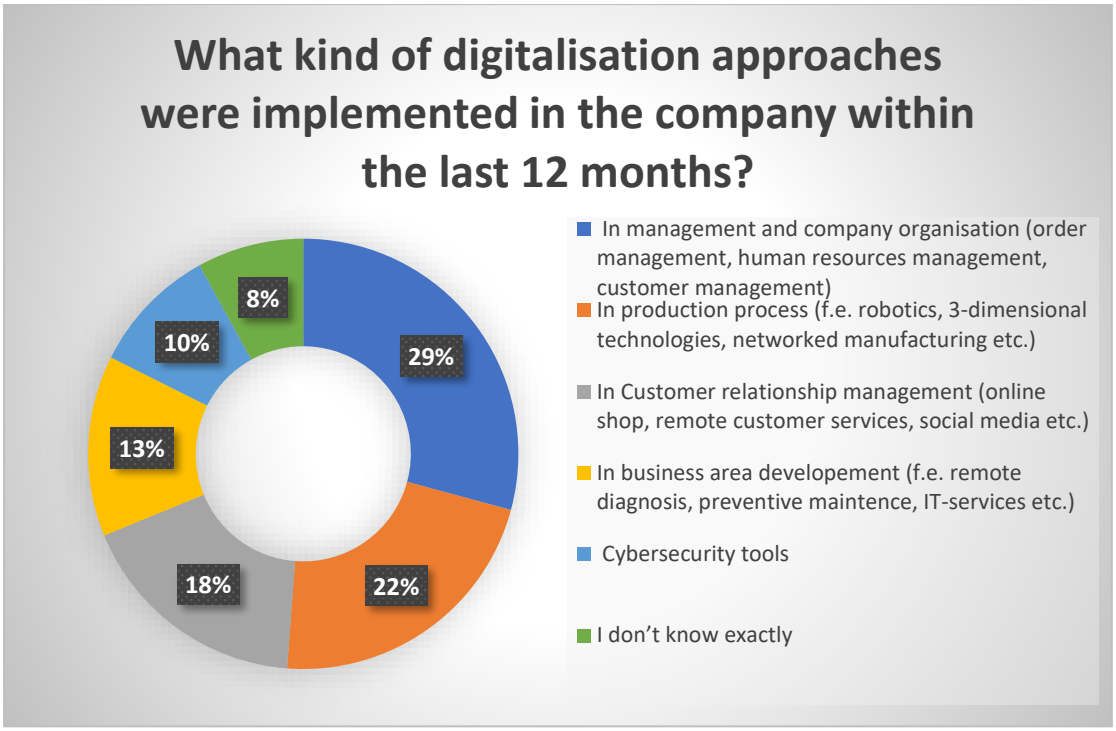
Cyber Security Tools (10%)

Digitization and cybersecurity are interconnected aspects of modern technology. Digitization refers to the process of converting information into a digital format, enabling it to be processed and stored electronically. As companies and employees increasingly rely on digital technologies, the need for robust cybersecurity tools becomes crucial to protect sensitive information and systems.

Combining effective digitization strategies with robust cybersecurity tools is essential for creating a secure and resilient digital environment. Companies must continually adapt and invest in cybersecurity measures to stay ahead of evolving cyber threats.

I don't know exactly (8%)

While digitization has become a widespread phenomenon, a small percentage of companies are still unsure of the specific approaches they have implemented. This may be due to lack of awareness or limited understanding of digitization. However, with the rapid advancement of technology, it is vital for these companies to embrace digitization to remain competitive in the market.



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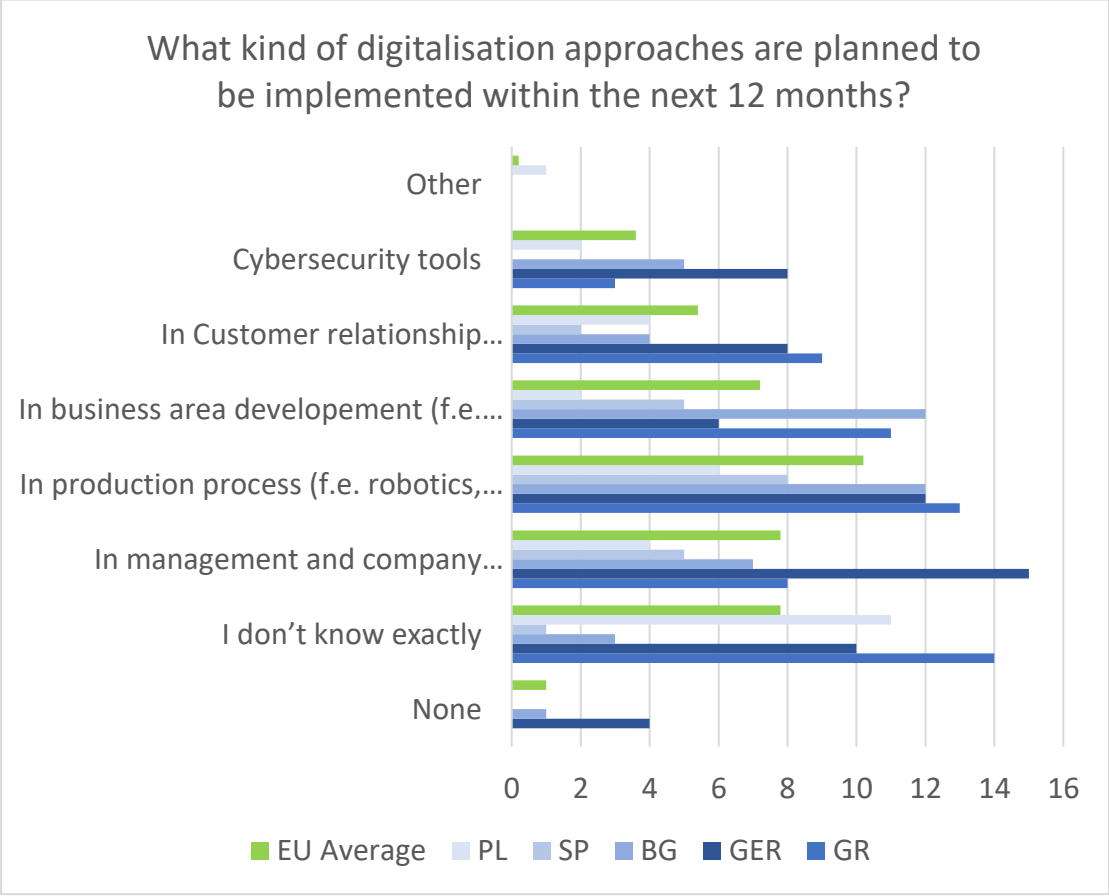


Some of the most required kind of digitalization approaches are planned to be implemented within the next 12 months are presented below.

Production Process (24%)

Digitization in the production process area refers to the integration of digital technologies and data-driven solutions to enhance and optimize various aspects of manufacturing.

Using more digitization in the production process, manufacturers can gain a competitive edge, respond more effectively to market demands, and achieve greater operational agility and efficiency.

Order Management, HR Management and Customer Management (19%)

Digitization plays a crucial role in enhancing efficiency, accuracy, and overall effectiveness across various business functions, including Order Management, HR Management, and Customer Management.

Digitization in these areas enhances operational efficiency, reduces manual errors, improves data accuracy, and ultimately contributes to better customer and employee experiences.

Business Space Development (17%)

To thrive in today's dynamic business environment, companies must focus on the continuous growth of their business segments. Digitization plays a central role in achieving this goal.

Customer Relationship Management (13%)

Digitization in the Customer Relationship Management (CRM) department involves leveraging digital technologies to streamline and enhance customer interactions, data management, and overall customer relationship processes. This transformation can result in improved efficiency, better customer experiences, and increased business productivity.

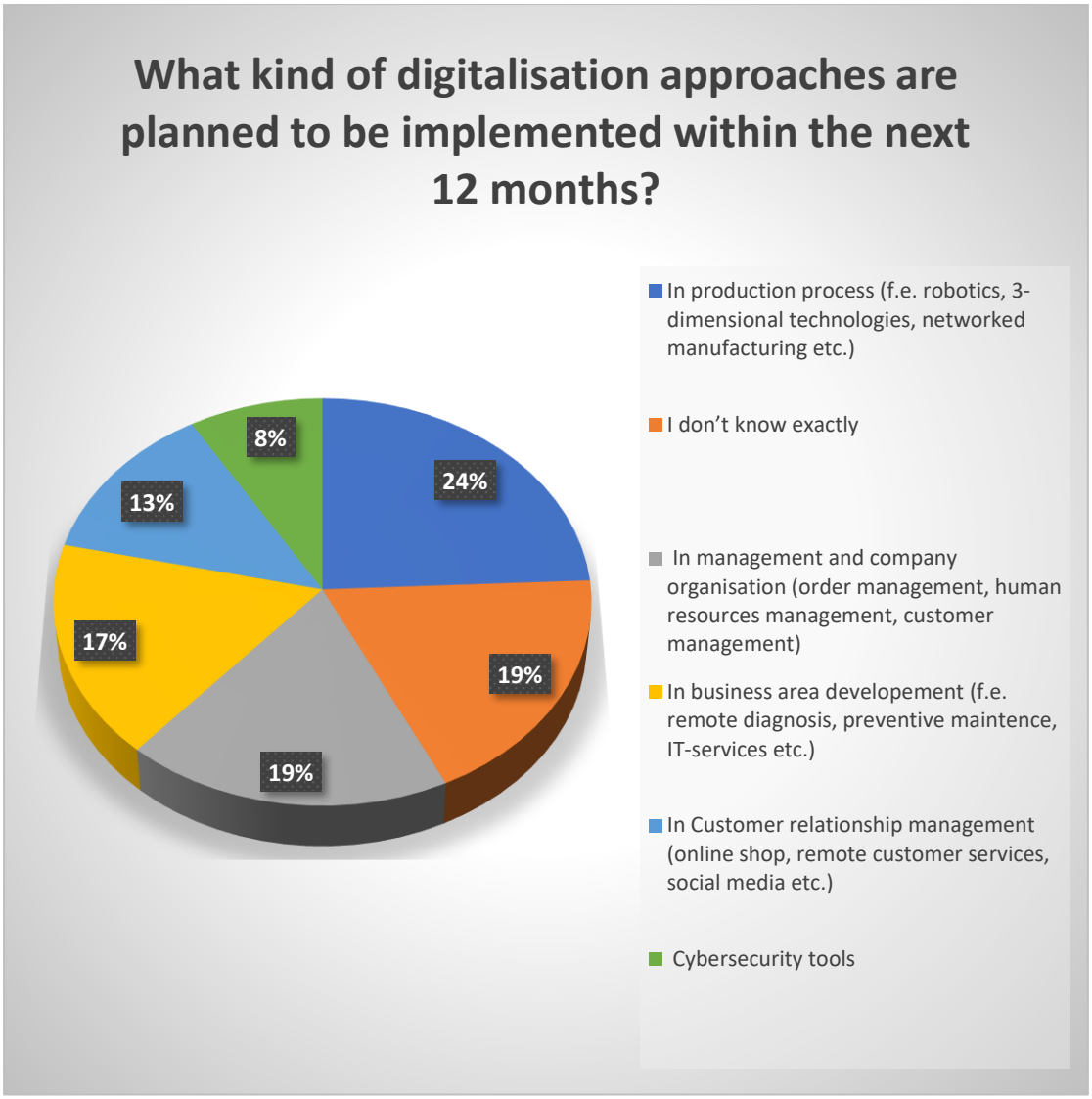
Is an ongoing process that requires a strategic approach, continuous evaluation, and adaptation to technological advancements. It plays a crucial role in staying competitive, understanding customer needs, and building long-term relationships.

Cyber Security Tools (8%)

As businesses increasingly rely on digital technologies, ensuring strong cyber security measures are of utmost importance. Cyber threats are constantly evolving and companies need to be proactive in protecting their digital assets.

I don't know exactly (19%)

While the survey results demonstrate a clear intention among companies to embrace digitalization, a significant percentage (19%) remain uncertain about the exact approaches they plan to implement.



3.4 Evaluation of the feedback

The FactCheck project conducted a comprehensive survey of electro industry employees to gauge the effectiveness of its research and its overall impact on the sector. The findings paint a detailed picture of the industry's current landscape, highlighting key trends in skills, training, digitization, and the challenges businesses face in today's dynamic environment.

The survey revealed that the electro industry is largely populated by small and medium-sized enterprises (SMEs), with a significant portion of the workforce concentrated in companies with 50-99 employees. This underscores the crucial role SMEs play in the industry's overall health. Furthermore, the average employee age falls within the 45-49 range, indicating a valuable pool of experienced workers. This emphasis on experience is further reinforced by the fact that the oldest employees often belong to the 60-64 age group, suggesting companies recognize the value of their senior workers' expertise.

In terms of skills and training, the survey results point to a strong emphasis on vocational education and training (VET). The majority of respondents reported having received vocational training, highlighting its perceived value in preparing individuals for careers in the electro industry. However, the survey also identified a growing demand for additional professional skills development. This is reflected in the finding that employees overwhelmingly consider "additional professional skills" to be the most important area for training.

The survey also delves into the most sought-after professional profiles within the electro industry. The Electronics Technician and Machine/System Operator roles emerged as the top contenders. Electronics Technicians play a vital role in ensuring the functionality and efficiency of electronic devices and systems, while Machine/System Operators are responsible for setting up, monitoring, and maintaining equipment to optimize production performance. These roles underscore the industry's growing reliance on technology and automation.

Looking towards the future, the survey identifies several key skills that are expected to be in high demand within the next five years. Robotics, CNC machine operation, design in a CAD environment, 3D printing, and manufacturing with computer assistance (CAM) are all seen as crucial for the industry's continued growth and adaptation to Industry 4.0 advancements. Additionally, respondents highlighted the importance of "soft skills" such as machine and tool handling, dexterity, teamwork, creativity, and analytical thinking, emphasizing the need for a well-rounded skillset to achieve high-quality work in an increasingly complex environment.

The survey also addressed the challenges faced by electro industry companies in the realm of staffing and employee acquisition. Inappropriate professional qualifications, low individual competence (autonomy, reliability, responsibility), and excessive salary expectations are identified as the most prevalent hurdles. Additionally, low work readiness, marginal motivation, and reduced interest in the industry, coupled with insufficient information about available career paths, further complicate the recruitment process.

However, the survey also explores potential solutions to bridge the gap between education and the workplace. On-the-job training is seen as the most effective approach, while early career guidance with comprehensive information strategies and practical experience placements are also viewed favorably. The survey underscores the importance of investing in educator training, equipping them with innovative methodologies and tools to prepare students for the realities of the industry.

The survey delves into the ongoing digitization of the electro industry, revealing that company management and organization have been the primary beneficiaries of digital transformation thus far. Production processes, customer relationship management (CRM), business development, and cybersecurity also saw significant digitization efforts in the past year. Looking ahead, companies plan to further embrace digitization in areas like production processes, company management, business space development, and customer relations. This highlights the industry's recognition of the critical role digitization plays in enhancing efficiency, competitiveness, and overall customer experience.

In conclusion, the FactCheck project survey provides valuable insights into the current state and future trajectory of the electro industry. By identifying key trends in skills, training, digitization, and staffing challenges, the survey offers a roadmap for stakeholders to navigate the evolving landscape and ensure the industry's continued success. The emphasis on

strengthening VET programs, fostering a culture of continuous learning, embracing digitization, and addressing staffing challenges through targeted initiatives are crucial steps for the electro industry to thrive in the years to come.

4. Outcome: Formulation of training concept with possible trends and developments

Formulating training concepts for the electro industry requires a deep understanding of industry trends and skill requirements.

The FactCheck project, after collecting and analyzing survey data conducted among electro industry professionals, aims to highlight these characteristics in order to create renewed training concepts. These training concepts should consider the new trends and developments that dominate the electro industry sector.

Listed below are some of the characteristics highlighted by workers in the electro industry that should be considered in education and training programs and the creation of training tools.

Continuous learning and skill development are essential for workers to remain competitive and adapt to new technologies.

It is important to consider the specific needs and skill requirements of industry professionals, from learning the latest electronic system knowledge to understanding advanced processes and procedures.

A set of training methods such as practical on-the-job training, training seminars or online courses are necessary for employees to remain competitive in the industry and adapt to new challenges and technologies.

By incorporating new technologies and trends such as digital transformation, robotics and automation into training programs, employees can update their skills to meet the challenges created in their work environment.

In addition to technical skills, soft skills such as communication, leadership and problem solving are becoming increasingly important in today's workforce. Therefore, training programs should place greater emphasis on the development of these skills.

Through training and information on the latest trends in the industry and the labor market, opportunities are created for employees for professional development, but also for companies in the industry for staffing with highly qualified personnel.

One of the most important aspects of formulating a training concept is ensuring that it is flexible enough to adapt to the ever-changing needs of the workforce.

Flexible training programs allow employees to learn at their own pace and in a way that is closer to their individual learning styles, which enhances the effectiveness of the training program.

One of the key trends in educational programs is the integration of digital tools and platforms. Through online learning modules and virtual reality simulations, technology has

revolutionized the way employees are trained. By incorporating technology into training programs, companies can provide a more engaging and interactive learning experience for their employees, leading to better knowledge retention and improved skill development.

As part of the Factcheck project, an online space, JODALab, was designed and implemented, where all interested parties can find useful material related to education and training.

A range of free online video and multimedia courses covering technical skills in the fields of electrical and metal industry as well as soft skills are available to the public.

The aim is for the site's material to be updated and enriched over time, so that it constitutes a useful educational tool both for employees and for vocational education and training providers.

5. Summary and Recommendations

Through the results of the survey carried out as part of the FactCheck project, are highlighted the characteristics and current situation regarding VET (Vocational Education and Training), skills and specific professional tasks in the metal industry.

Digitization and the new technologies that follow Industry 4.0 create new training needs of workers, updated skills and new professional profiles. In this modern professional environment that is being created, new training and education plans and modern education tools will have to be designed.

Vocational Education and Training (VET) centers play an important role in providing workers with the necessary knowledge and skills for their successful careers in various branches.

The scientific staff and professors of vocational education and training centers are invited to be updated with the latest knowledge, techniques and developments regarding the subjects they teach.

In this way, they will be able to impart modern knowledge and techniques to their trainees so that they are well prepared to work in the modern working environment.

In addition, VET teachers and trainers need to possess in-depth knowledge about their subjects, be proficient in delivering effective instruction, and be familiar with the industry requirements. They should also have the ability to engage and motivate their students, catering to their individual needs and learning styles.

Recommendations:

Lifelong teacher education:

The continuous training of VET teachers and trainers is deemed necessary, especially in new technologies and subjects related to professional skills. The participation in seminars and workshops related to VET helped to inform them about the latest teaching methods, new technologies and industrial practices.

Use of technology in education:

The use of new technologies in VET improves the educational process by making it more attractive and student-friendly. Lessons are made more dynamic and interesting by using interactive tools, educational software and Internet platforms. The use of multimedia, simulations and films can simplify difficult topics and make them easy to understand for students.

Cooperation with the Electro industry sector:

The creation of relationships and collaborations with businesses related to the vocational training programs offered is considered achievable and necessary. This will allow instructors to include real-world examples and provide students with hands-on practice, increasing the relevance and value of their education. It will also help companies in the sector to hire trained and qualified staff immediately and cover their needs.

Continuous assessment:

The effectiveness of teaching methods and course content is essential and should be done on a continuous basis. Observations and comments from learners, trainers, industry professionals and all those involved in VET should be taken into account. With continuous feedback, errors or omissions in the educational process are identified, as well as areas that need improvement, so that the necessary adjustments can be made.